C-E ENVIRONMENTAL, INC.

WET SULFURIC ACID - SO_2 AND NO_x REDUCTION
DEMONSTRATION PROJECT

OHIO EDISON STATION, UNIT NUMBER 2
NILES, OHIO

ENVIRONMENTAL INFORMATION VOLUME

Prepared for:
U.S. DEPARTMENT OF ENERGY

Prepared by:
C-E Environmental, Inc.
Portland, Maine

Project Sponsors:
U.S. DEPARTMENT OF ENERGY
COMBUSTION ENGINEERING, INC.
SNAMPROGETTI USA, INC.
OHIO EDISON COMPANY
OHIO COAL DEVELOPMENT OFFICE

August 1990

COMBUSTION ENGINEERING

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Job No. 5890-00

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AUGUST 1990

ENVIRONMENTAL INFORMATION VOLUME
WSA-SNOX DEMONSTRATION PROJECT

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1.0 INTRODUCTION

1.1 BACKGROUND

On March 18, 1987, the President of the United States announced several steps to determine and address the effects of acid deposition, a pollution issue of increasing international importance. The centerpiece of this initiative was a proposed five-year funding program to support demonstrations of coal-based energy technologies that offer promise for significantly reducing key air pollutant emissions (namely sulfur dioxide and nitrogen oxides) and would be applicable to a large number of existing sources that contribute to international air pollution. The Innovative Clean Coal Technology (ICCT) program arose from Public Law 100-202, and was signed into law on December 22, 1987. The ICCT program includes provisions for the U.S. Department of Energy (DOE) to fund cost-shared, clean-coal technologies capable of retrofitting or repowering existing coal-fired facilities.

DOE issued a Program Opportunity Notice (PON) in February 1988, requesting proposals for the ICCT program. DOE subsequently selected for cost-shared federal funding and further project-specific study a wet-gas sulfuric acid/sulfur dioxide and nitrogen oxides (WSA-SNOX) flue gas clean-up technology that will be demonstrated at an existing generating facility near Niles, Ohio.

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This Environmental Information Volume (EIV) has been prepared for the WSA-SNOX project as one step in an overall strategy for ICCT program compliance with the National Environmental Policy Act (NEPA). This strategy is consistent with the Council on Environmental Quality (CEQ) NEPA regulations (40 CFR 1500-1508) and DOE NEPA guidelines (52 FR 47662). The strategy includes programmatic and project-specific assessments of environmental effects. DOE prepared a Programmatic Environmental Impact Analysis (PEIA) before selecting specific ICCT projects (DOE, 1988). The information provided by the PEIA was incorporated into the DOE project selection process. Also before selection, DOE prepared a project-specific environmental review of each proposal that underwent comprehensive evaluation. DOE considered the preselection documents (although unavailable to the public to protect proprietary information) during the selection process. After selection of specific ICCT projects, but before award of funding, project sponsors are required to submit an EIV to DOE providing a range of project-specific environmental information, as specified in Appendix J of the DOE PON (DOE, 1988). DOE will use the information to prepare site-specific NEPA documentation. This EIV addresses information needs itemized in Appendix J of the PON pertinent to the WSA-SNOX project.

The WSA-SNOX demonstration project has been proposed by Combustion Engineering, Inc. (C-E), and Snamprogetti USA, Inc. (Snamprogetti). Other project sponsors include the Ohio Coal Development Office and the Ohio Edison Co. (Ohio Edison).

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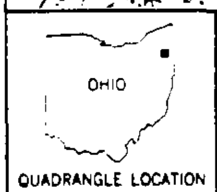
1.2 SUMMARY OF IMPACTS

The WSA-SNOX demonstration project is designed to minimize detrimental effects to human and natural environments. Project operations will occur at an existing electricity-generating facility. The WSA-SNOX demonstration project is expected to have a positive effect on air quality in the region and a neutral effect on water and land quality; wildlife and vegetation resources; and aesthetic, cultural, and infrastructure conditions of the area.

Benefits of the project may be substantial, deriving specifically from the project and generally from the anticipated commercialization of the demonstrated technology. Project-specific benefits include reduced air emissions and favorable socioeconomic effects during project construction and operation. Widespread commercialization of the successfully demonstrated technology in other retrofitting applications has potential to substantially benefit the existing environmental quality.

Solid by-products generated by the project (e.g., slightly increased quantities of fly ash and a small quantity of a vanadium/fly ash mixture) are not expected to be characterized as hazardous. Fly ash from the WSA-SNOX project will be stored in the existing ash pond area and handled as is currently generated ash. The fly ash contaminated with vanadium will be handled separately and disposed of at some other site. The project will not affect available land supply and is compatible with existing and planned uses. Flood-prone areas will not be encroached upon by new facilities.



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WARREN, OHIO 1959, PHOTOREVISED 1984
7.5 MINUTE SERIES

SCALE

0 2000 4000 FEET

FIGURE 2-1
SITE LOCATION MAP
WSA-SNOX DEMONSTRATION PROJECT
OHIO EDISON NILES STATION
NILES, OHIO

C-E Environmental, Inc.

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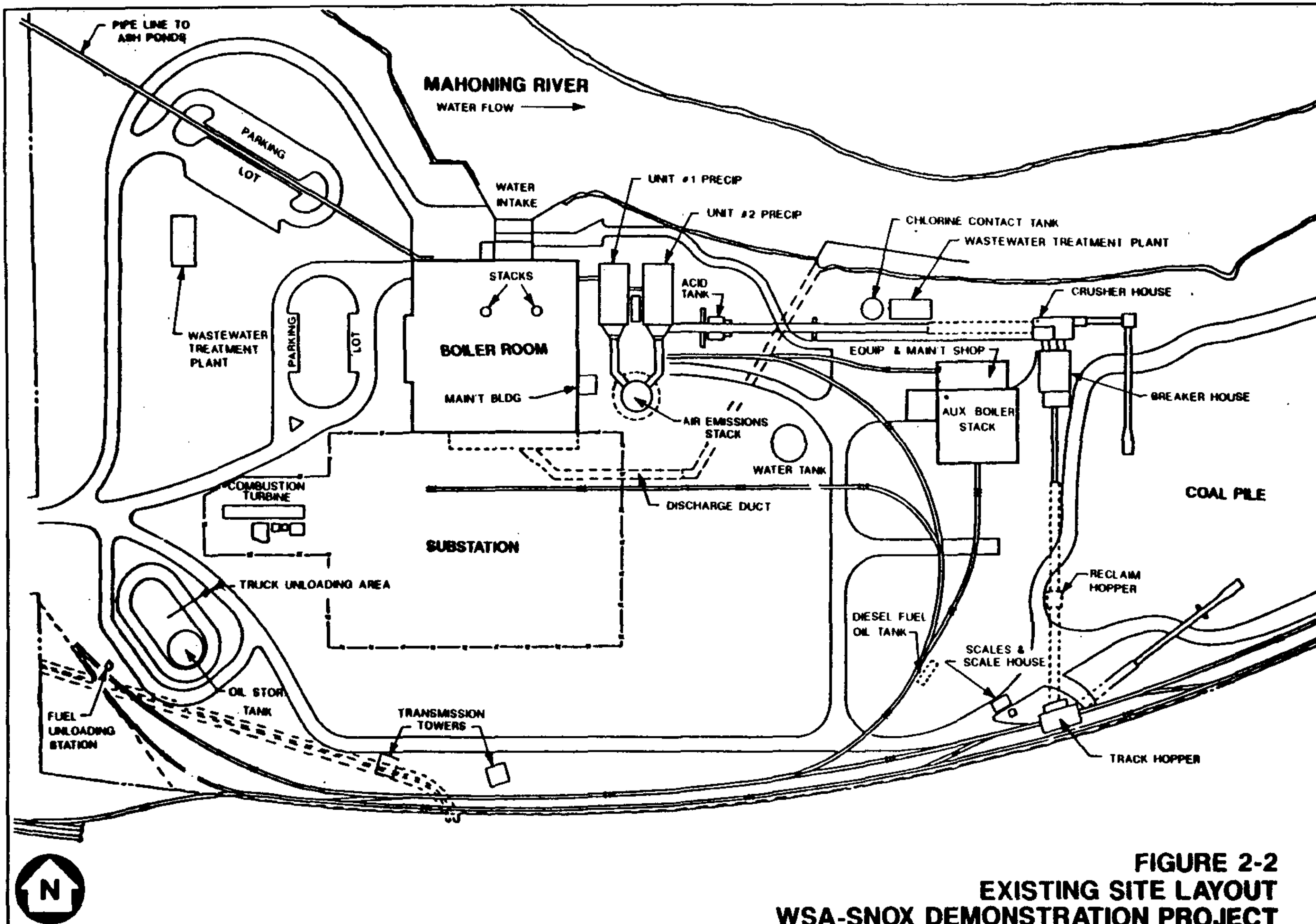

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FIGURE 2-2
EXISTING SITE LAYOUT
WSA-SNOX DEMONSTRATION PROJECT
OHIO EDISON NILES STATION
NILES, OHIO

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A combustion turbine wi

the Ohio Edison Niles s

fuel oil exclusively.

atmosphere by a 393-foo

steel-lined flues, each

minute (cfm). Two 300-

Two on-site sewage treatment plants process sanitary wastewaters generated by the Ohio Edison Niles facility. Treated wastewater from the plant is discharged by way of permitted outfalls to the Mahoning River. The facility monitors and reports flow, temperature, pH, five-day biological oxygen demand (BOD_5), total suspended solids (TSS), fecal coliform, and total residual chlorine. The Mahoning River has not been extensively monitored by the Ohio EPA for water quality since 1980. Water chemistry data, consisting of one sample per site of either metals or sediments have been collected since 1980. Available data for Mahoning River from Niles to Youngstown do indicate improvement in the sediment/trace metals results (see Section 3.3.1).

The ash settling and storage area, consisting of three ash-settling ponds, is west of the Ohio Edison Niles plant. Bottom and fly ash are sluiced separately through aboveground pipelines to the ash pond area. Two ponds hold fly ash and currently encompass 4.4 acres and 2.8 acres, respectively. A third pond covering 3.5 acres contains bottom ash. The Reed Mineral Division of the Harsco Corporation of Highland, Indiana, is constructing equipment in an approximately 1.5-acre working area for processing bottom ash collected from the pond for reuse. Bottom ash is removed continuously from the pond and stored on-site for future sale; fly ash is removed approximately every eight years and transported to a licensed landfill. The Ohio Edison Niles plant generates approximately 70,000 tons of ash yearly, approximately 80 percent of which is bottom ash and 20 percent is fly ash. There are no groundwater monitoring requirements for the site. Ohio EPA has not received complaints of groundwater contamination problems in the area.

Wastewater from the bottom and fly ash ponds is discharged through a permitted outfall to the Mahoning River. Ohio Edison monitors and reports flow, TSS, oil and grease, pH, total iron, and total copper. Because the ash ponds are not lined, the potential for seepage exists; however, any potential ash pond leachate would be similar, if not identical, to supernatant currently discharged through the permitted outfall.

On a monthly basis, Ohio Edison submits an analysis of their NPDES monitoring data to Ohio EPA. Review of past compliance inspection reports by Ohio EPA's Compliance and Enforcement Section of the Division of Water Pollution Control, indicate that Ohio Edison Niles has consistently operated in compliance with the standards and conditions of their NPDES permit.

Ohio Edison Niles employs 100 people: five in administration; 43 in operations; 21 in mechanical maintenance; eight in electrical maintenance, nine in instrumentation and controls; and 14 in the yard sections.

The Ohio Edison Niles facility also contains an elevated water storage tank, substation, fuel oil storage tanks, parking areas and rail lines.

2.1.2 Engineering Description of the Proposed Action

2.1.2.1 Description of Project. The WSA-SNOX demonstration project will be operated to treat one-third of the flue gas stream from Unit No. 2 (78,000 standard cubic feet per minute [scfm]), or approximately 16 percent of the total

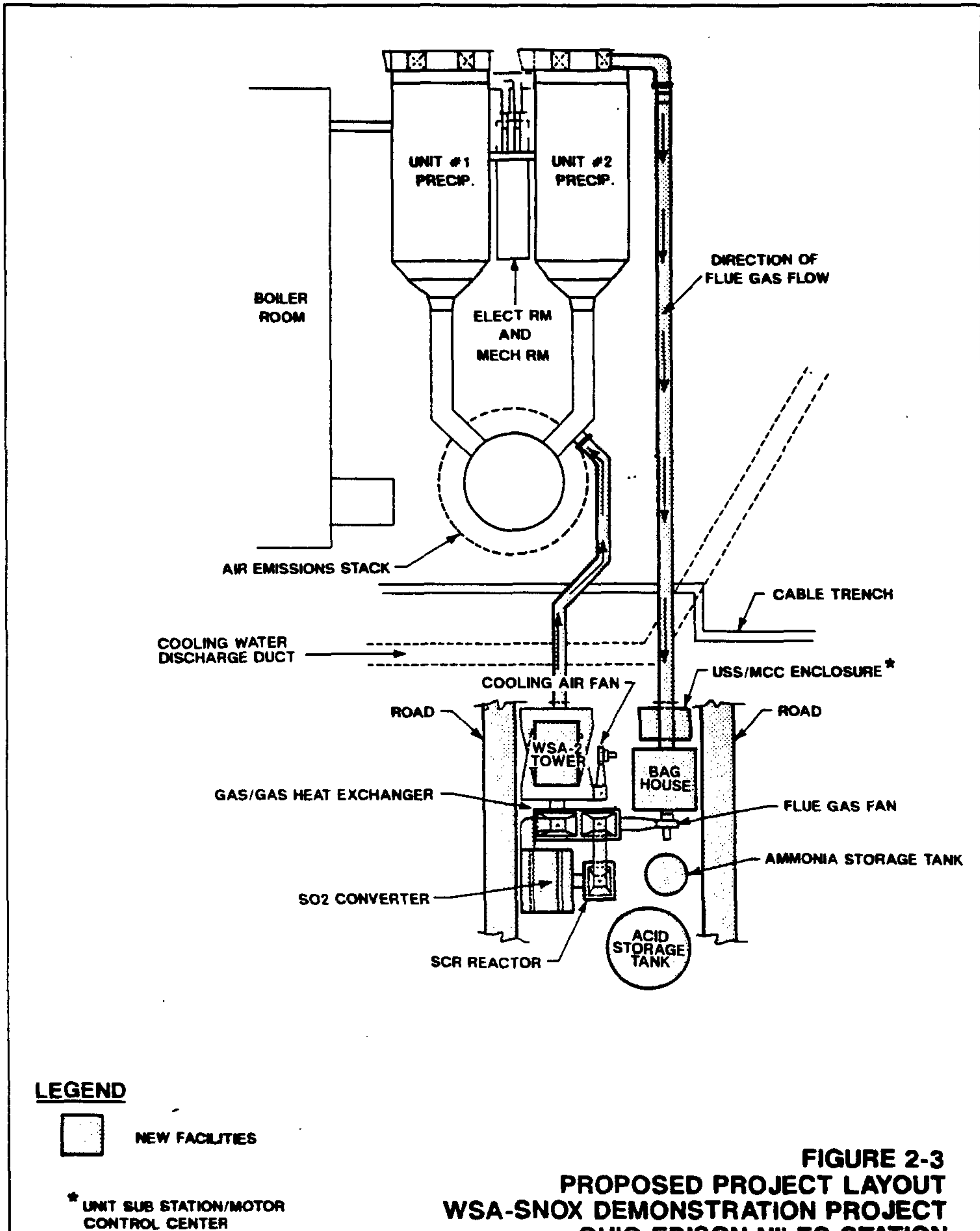

FIGURE 2-3
PROPOSED PROJECT LAYOUT
WSA-SNOX DEMONSTRATION PROJECT
OHIO EDISON NILES STATION
NILES, OHIO

C-E Environmental, Inc.

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TABLE 2-1
MAJOR EQUIPMENT FOR WSA-SNOX PROJECT

ENVIRONMENTAL INFORMATION VOLUME
WSA-SNOX DEMONSTRATION PROJECT

Baghouse

Flue Gas Fan/Motor/Control Damper

Gas/Gas Heat Exchanger

SCR Reactor

Flue Gas Heater

Direct Fire Duct Heaters and Blower System

Ammonia Injection and Storage System

Sulfur Dioxide Converter

WSA-2 Condensing Tower

Cooling Air Fan/Motor Control Damper

Fly-Ash-Handling System

Acid Collection and Storage System

Fuel Supply Systems

Instrumentation and Controls Equipment for the Process, Baghouse and Fly Ash-Handling Systems

Guillotine Dampers

Flue Gas and Air Ductwork/Expansion Joints

Electrical Equipment (e.g., switchgear, unit substations, motor control centers)

Control and Instrumentation Systems

Flue Gas Analysis Monitoring Equipment

Water Supply Systems

Control and Instrument Air Systems

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flue gas generated at the plant. Project facilities will be installed on a 150-by-120-foot unoccupied area directly adjacent to the main building. Figure 2-3 is a conceptual layout plan of new facilities in relation to existing facilities. Major equipment groups required for the WSA-SNOX project include a baghouse, heat exchangers, catalytic converters for converting nitrogen and sulfur dioxides, an acid-collection and storage system, and a 35-foot-high condensing tower. New major equipment and supplies are summarized in Table 2-1.

The WSA-SNOX process combines selective catalytic reduction and wet sulfuric acid technologies to simultaneously remove nitrogen oxides and sulfur oxides simultaneously from flue gases. In the process, sulfur dioxide is oxidized catalytically to sulfur trioxide and recovered as concentrated sulfuric acid, while nitrogen oxides are reduced to free nitrogen by catalytic reduction with ammonia. Carbon monoxide and hydrocarbons left uncombusted from the boiler are oxidized in the sulfur dioxide converter. Figure 2-4 is a flow diagram of the WSA-SNOX process. Key components of the WSA-SNOX process are summarized in the following subsections.

Flue Gas Conditioning Mode

The ash-loaded gas slipstream (about one-third of the total flow from Unit No. 2) is bypassed between the air preheater and ESP. This slipstream is first heated in a fuel oil (or methane)-fired heater to approximately 400°F. Currently, indirect heating is somewhat preferred because it does not result in small changes in flue gas composition, as would be the case with an inline

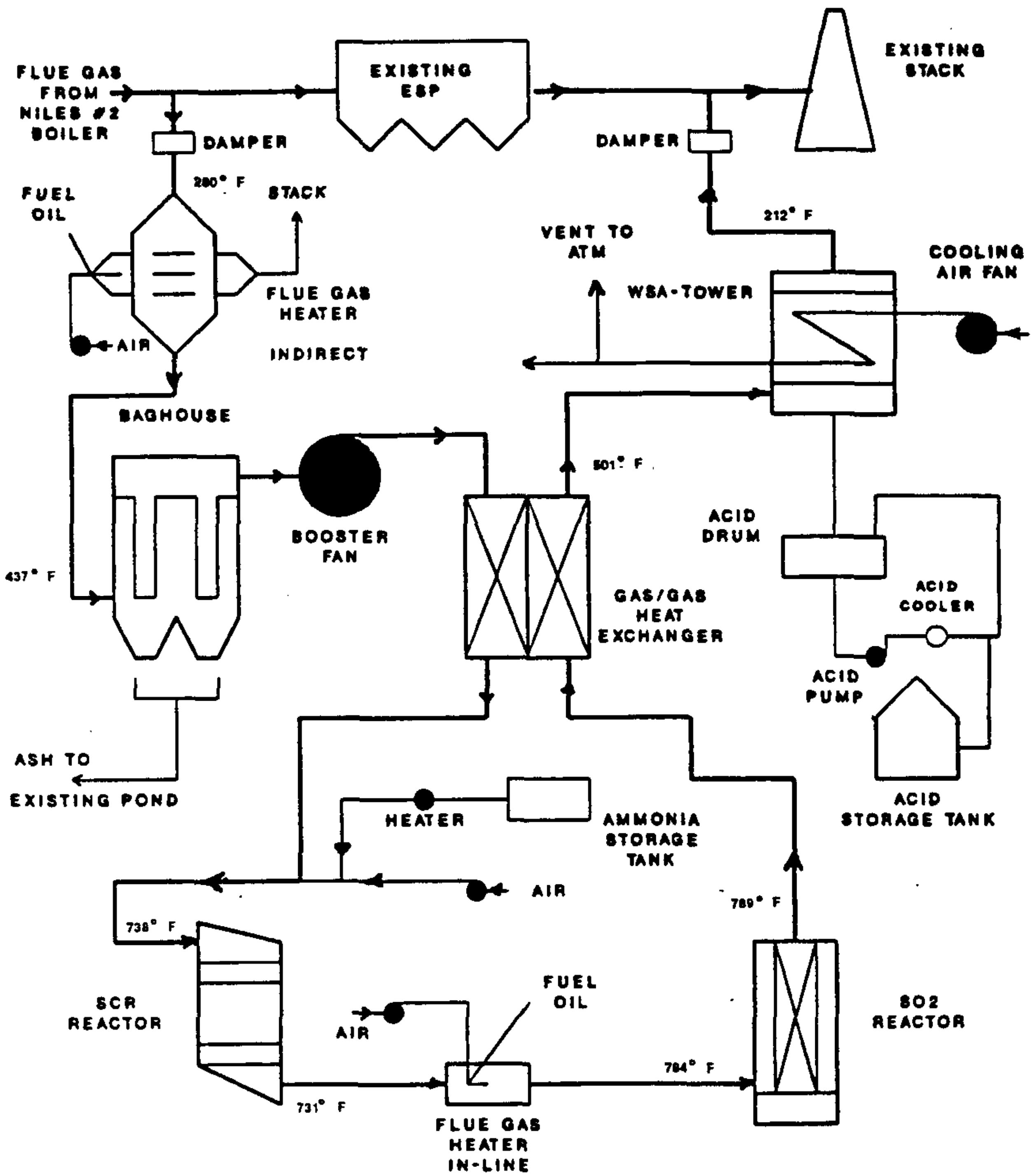

FIGURE 2-4
PROCESS FLOW DIAGRAM
WSA-SNOX DEMONSTRATION PROJECT
OHIO EDISON NILES STATION
NILES, OHIO

C-E Environmental, Inc.

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burner. Another alternative, which might be considered later to lower overall operating costs, is a bypass arrangement of the air preheater, which will eliminate the need for an external heater.

Flue gas flows from the heater to the baghouse, which will be equipped with bags lined with a polytetrafluoroethylene (PTFE) membrane. The PTFE membrane, a patented coating of Teflon applied to one side of the bag filter cloth, improves the baghouse filtering and cleaning capabilities. The bags are capable of operating under high temperatures (up to 500°F) and can remove particulate matter down to very low levels (1 milligram (mg) per normal cubic meters or about 0.001 pounds per million British thermal units [lb/MMBtu]).

It should be pointed out that for the bag filter, there is only limited data on full commercial sized units for achieving the low dust loadings (1 mg/normal cubic meters [Nm^3]) specified for the WSA-SNOX demonstration unit. This level of dust has been obtained in the 3 MW Danish test unit (which has several parallel bag filter materials in operation). In addition, the bag filter vendor feels the desired level is obtainable. Nevertheless, in the event dust loadings exceed the design target, the WSA-SNOX unit can operate with very little adjustment. The low dust loadings have been chosen in order to limit the sulfur dioxide (SO_2) conversion catalyst dedusting operation to about once or twice a year. This has been done primarily for reasons of commercial acceptability not for economic reasons or added on-line time (as the dedusting is accomplished during the operation of the WSA-SNOX unit).

Selective Catalytic Reduction Mode

After the flue gas stream is passed through the baghouse, it is heated in the gas/gas heat exchanger to the operating temperature of the Selective Catalytic Reduction (SCR) reactor (above 500°F). The flue gas is then mixed with ammonia upstream of the SCR reactor, in which the nitrogen oxide is reduced to nitrogen gas and water. The reaction mechanism for the SCR is as follows:

$$4\ NO + 4\ NH_3 + O_2 \rightarrow 4\ N_2 + 6\ H_2O + Q(\text{Heat})$$

Ammonia (NH_3) required for the SCR reactions is injected into the flue gas as an ammonia/air mixture. The amount of injected ammonia is proportional to the amount of nitrogen oxide measured upstream of the SCR reactor. The catalyst for the SCR reactor will be of monolithic (i.e., honeycomb) type developed by Haldor Topsoe especially for use in the WSA-SNOX process.

Sulfur Dioxide Conversion Mode

Flue gas exiting the SCR reactor is then heated to approximately 790°F. It is expected that natural gas will be used; however, No. 2 fuel oil is an acceptable alternative. The additional fuel burned in the flue gas heater increases the flue gas flow by about 2 percent. The sulfur dioxide converter consists of eight narrow vertical beds containing Haldor Topsoe catalyst-type VK38 in 10-millimeter rings. This type of catalyst is used in conventional sulfuric acid plants to convert sulfur dioxide to sulfur trioxide. The operating conditions are similar to those used by sulfuric acid plants. The catalyst dimensions for the demonstration unit will be similar to those used in commercial-scale plants: a depth of 2 feet, width of approximately 6 feet, and an effective height of approximately 28 feet.

In the sulfur dioxide converter, approximately 96 percent of the sulfur dioxide reacts with oxygen to produce sulfur trioxide through the following reaction mechanism:

$$2\ SO_2 + O_2 \longrightarrow 2\ SO_3 + Q(\text{Heat}).$$

Carbon monoxide and hydrocarbons are oxidized to carbon dioxide and water, and excess ammonia from the SCR is converted to free nitrogen and a small amount of nitrogen oxides due to the selective nature of the catalyst to the reaction.

The sulfur dioxide reactor acts also as a final dust filter which removes about 95 percent or more of the remaining dust in the gas. The dust (fly ash) is trapped in the catalyst beds which, therefore, must be cleaned at intervals by sifting the catalyst. The cleaning is carried out cyclically on a pair of beds at a time by a semi-automatic system without disturbing the continuous operation of the sulfur dioxide reactor. The reason why the sulfur dioxide reactor acts as a dust filter is that at operating temperature the catalyst softens and becomes sticky thus trapping the dust in the bed. All the dust, however, comes off easily by sifting the catalyst. For a given catalyst volume, the cycle time between siftings is inversely proportional to dust content and capacity. For the WSA-SNOX project, given the low dust content of the flue gas exiting from the bag filter, it is estimated that only one to two annual siftings per bed will be necessary.

Acid Condensation Mode

The oxidized flue gas exiting the sulfur dioxide reactor is then cooled by the incoming raw gas in the gas-gas exchanger. During cooling, part of the sulfuric acid is formed by a gas-phase reaction between sulfur trioxide and water vapor. Because the cold inlet temperature to the gas-gas heat exchanger is kept above the acid dewpoint temperature, there is no risk of acid condensation in the heat exchanger.

Finally, the gas is cooled by air to about 210°F in the WSA-2 tower/acid condenser before it is sent to the existing stack. The exiting gas will contain approximately 5 to 10 parts per million (ppm) sulfur trioxide. The WSA-2 tower houses a falling-film condenser in which flue gas containing sulfuric acid is cooled inside vertical boro-silicate glass tubes by air outside the tubes. After the hot sulfuric acid is collected, it is cooled and pumped to a nearby storage tank. The WSA-SNOX project is expected to produce 3,496 lb/hr of sulfuric acid during operation. The actual quantity of sulfuric acid produced will depend on the sulfur level of the coal (probably less than 4 percent) and the actual operating hours of the WSA-SNOX project (estimated at 65 percent, or 5,694 hours per year). The WSA-2 acid condensing tower has been designed to minimize sulfuric acid mist in the exiting flue gas. The actual amount of sulfuric acid mist contained in the exit gas will be monitored during operation.

2.1.2.2 Description of Installation Activities. The WSA-SNOX demonstration project will span 42 months, with 24 months of plant operation dedicated to demonstrations. Construction is tentatively slated to begin in July of 1991. The eight-month construction effort is planned to utilize primarily local labor resources, with construction management and supervision provided by C-E. Project construction should not adversely affect operations at the Ohio Edison Niles plant. Most process equipment will be pre-fabricated and transported to the site by truck. Equipment supplied by Snamprogetti and Haldor Topsoe will be shipped from Europe and transported overland by truck.

Following the demonstration project, the test equipment will be dismantled and moved off-site; however, if the project proves technically reliable, project participants have the option to maintain the equipment for further use.

2.1.2.3 Project Source Terms. Project source terms include project resource requirements and discharges. Effects of project discharges on the existing environment are discussed in Section 4.0.

Project Resource Requirements

Because the WSA-SNOX demonstration project will take place at an existing power plant, many project resource requirements are already available and in-place. Project resource requirements are listed in Table 2-2.

TABLE 2-2
WSA-SNOX PROJECT RESOURCE REQUIREMENTS

ENVIRONMENTAL INFORMATION VOLUME
WSA-SNOX DEMONSTRATION PROJECT

RESOURCE	STATION REQUIREMENTS WITHOUT PROJECT	WSA-SNOX ADDITIONAL REQUIREMENTS
Fuel Oil No. 2	50 gpm	1,416 (lb/h) 3.3 gpm
Coal (Unit No. 2)	288,500 tons	0
Water		
Total	140.5 mgd	--
Cooling Process	136 mgd	0.12 mgd
Ammonia	34.5(lb/hr)	139.3 (lb/hr)
Concentrated Sulfuric Acid for Start-up	115 tons	1 ton
Power	7 MW	1,017 kW/hr
Labor		
Construction	N/A	50,000 labor hours 30 to 40 full-time workers
Operating	100 full-time workers	5 full-time workers
Land	130 acres	0

The WSA-SNOX project will treat one-third of the flue gas stream currently generated by Unit No. 2, which utilizes approximately 288,000 tons of coal annually. No additional coal resources will be required for the demonstration project. Coal will be delivered and handled according to customary procedures.

Operation of the flue-gas heaters will require approximately 1,416 pounds per hour (lb/hr) of No. 2 fuel oil. Fuel oil is currently used in the main power plant to start up the two coal-fired units and to run the combustion turbine. Ohio Edison Niles maintains an approximate 60-day operating supply of fuel oil for start-up purposes and a separate five-day operating supply for the combustion turbine. Fuel oil is stored on-site in two tanks and deliveries are made on an as-needed basis by truck.

Ammonia is currently being utilized on site during operation of the ESPs. The WSA-SNOX process will require ammonia for conversion of nitrogen oxides to nitrogen and water vapor in the nitrogen oxide reactor. Approximately 139.3 lb/hr of ammonia, or a total of 1,220 tons during the two-year demonstration period, will be needed to run the project. Ammonia for the project will be purchased from Ohio Edison Niles's current supplier and delivered by truck to the site. A 40-by-20-foot carbon steel tank, designed to hold a two-week supply of ammonia (i.e., approximately 7,500 gallons), will be installed in the demonstration project area.

Sulfuric acid is currently used on-site for regenerating the make-up demineralizer ion-exchange resin beds. One ton of concentrated sulfuric acid will be purchased from Ohio Edison Niles's current supplier for project start up.

The demonstration project will require 128 gallons per minute (gpm) of water for cooling purposes. This water will be obtained from the Mahoning River through Ohio Edison Niles's existing water intake structure. The WSA-SNOX project will be located entirely on the Ohio Edison Niles site, adjacent to the main building. The process equipment area will encompass an unoccupied portion of the site, approximately 120 by 150 feet, not including the piping and ductwork needed to tie in Unit No. 2 to the project facilities. The WSA-SNOX project requires 1017 kW of power to operate. Assuming the project will operate 65 percent of the time, 24 hours per day, 365 days per year, it is estimated that 5,791 MW-Hrs/yr of auxiliary power will be required to run the project. This power will be drawn from power generated by plant operation.

The construction labor requirement for the demonstration project is roughly estimated at 50,000 labor hours (i.e., equivalent to 40 full-time workers) during the eight-month construction period. Construction labor needs will be predominantly met from the regionally available labor pool. Construction management and supervisory personnel will be supplied by C-E. It is estimated that no more than five people will be needed to operate the WSA-SNOX unit on a continuous basis, seven days per week. Most project equipment will be fabricated in Europe or the U.S., and transported on-site by boat and/or truck.

Project Discharges

The WSA-SNOX demonstration project is expected to significantly reduce sulfur dioxide, nitrogen oxides, and particulate emission rates with minimal environmental effects.

Based upon most recent (1988) coal consumption, Ohio Edison Niles plant emissions (i.e., for Units Nos. 1 and 2) would be significantly higher without the proposed project. Relative comparisons follow.

	EMISSIONS (TONS/YR)	
	MOST RECENT	PROJECTED
POLLUTANT	WITHOUT PROJECT	WITH WSA-SNOX PROJECT
Sulfur dioxide	36,770	31,204
Nitrogen oxides	6,073	5,190
Particulates	153	129
Sulfur Trioxide	265	223

Ammonia emissions will be essentially zero. The estimated 5 ppm excess ammonia should be almost completely converted to nitrogen dioxide in the reactor. Sulfur trioxide emissions were estimated using the U.S. EPA emission factor document, AP-42.

The amount of fly ash collected at the plant will increase slightly during project operation due to the higher removal efficiency of the baghouse compared to the ESPs. An estimated 7,788 tons of fly ash will be recovered from the baghouse annually; the chemical and physical properties will be identical to fly ash removed from the Ohio Edison Niles ESPs. Fly ash removed from the baghouse will be sluiced to on-site ash ponds through the existing ash-handling system.

A small amount of fly ash will be retained on the surface of the catalyst in the sulfur dioxide converter which must, therefore, be cleaned at intervals. The catalyst, which is vanadium-based, may retain 30g dust per kilogram of catalyst before cleaning is required, meaning that the catalyst should be cleaned every

1,600 or 8,000 hours for a dust content in the flue gas of 5 and 1 mg/N³/h, respectively. Apart from fly ash, the dust from the sifting operation will also contain some catalyst dust. The approximate proportion by weight is:

Fly Ash	75 percent by weight
Catalyst	25 percent by weight

The estimated annual "production" of catalyst-contaminated fly ash from the demonstration project is thus:

FLY ASH IN FLUE GAS (mg/Nm^3)	CONTAMINATED FLY ASH (kg/yr)
1	1,400
5	7,000

During the dedusting or cleaning, a small amount of catalyst and thereby vanadium pentoxide, may be lost. The potential loss of catalyst, based upon pilot data, is approximately 1 to 5% of the total catalyst weight. Therefore approximately 985 to 4,925 pounds of catalyst may be lost. Since the vanadium pentoxide (V_2O_5) portion of the catalyst is approximately 7%, the potential total V_2O_5 loss during cleaning is 70 to 350 pounds. The vanadium contained in the coal is expected to be in the range of 0.01% to 0.1% by weight. This concentration range would add a maximum of 3 pounds of V_2O_5 loss during cleaning so that the maximum V_2O_5 loss during cleaning would be 350 + 3 or 353 pounds.

USEPA Extraction Procedure (EP) Toxicity testing and analysis of physical properties, along with leachate testing, will be conducted on representative samples of vanadium-containing fly ash. Results of these analyses are anticipated to provide adequate evidence to regulatory authorities and Ohio Edison Niles that the vanadium-containing fly ash is non-toxic and could safely be commingled with conventional fly ash. Notwithstanding the preceding, this vanadium-containing fly ash will be handled and stored separately and not commingled with the conventional fly ash produced at the Niles Plant.

The demonstration project will utilize approximately 128 gpm of Mahoning River water for cooling purposes. Cooling water from WSA-2 condenser tower will be discharged to the river through the existing National Pollutant Discharge Elimination System (NPDES)-permitted outfall. Project discharge water will contain heat and a small amount of chlorine, which is regulated under the existing NPDES permit. Project cooling water quality is expected to be virtually identical to cooling water currently generated by the plant.

Stormwater runoff from the new project area will be directed as is currently. Stormwater runoff volume should not be significantly affected by the project, which will introduce limited new impervious surfaces in an already largely impervious area.

A high-concentration sulfuric acid will be the by-product of the WSA-SNOX project. An estimated 42 tons per day of sulfuric acid will be generated under full-operating capacity. Efforts are being made to locate a suitable market for sale of the concentrated sulfuric acid. Sulfuric acid generated during project operation may be stored on-site in a 20-by-40-foot carbon steel tank for up to 60 days.

2.1.2.4 Potential Environmental, Health, Safety, and Socioeconomic Receptors. The proposed WSA-SNOX demonstration project should not result in additional risks to worker health and safety compared to those demonstrated by the current facility, other than the generation of additional sulfuric acid and temporary storage of vanadium pentoxide. Operation of the demonstration project will be regulated by Occupational Health and Safety administration (OSHA) standards (29 CFR Part 1926). Installation of the fabric filter, WSA-SNOX unit, and associated equipment will be covered by OSHA standards (29 CFR Part 1910). OSHA workplace standards cover working surfaces, means of ingress and egress, operation of powered equipment, adequate ventilation, noise exposure control, fire protection, and electrical equipment safeguards.

Also included and adopted by the state of Ohio is the OSHA Hazard Communication Standard (29 CFR 1910,1200). The plant operations manual, which covers worker health and safety procedures for the existing facility, will be revised to include any additional precautions associated with operation of the new scrubber.

Both sulfuric acid and vanadium pentoxide are classified as "extremely hazardous substances," under the federal Superfund Amendments and Reauthorization Act (SARA) Title III. Therefore, SARA Title III emergency planning and release notification will be applicable. However, because the plant is a utility, it will not have to submit inventory information for these chemicals. Sulfuric acid will be generated in sufficient quantity to be regulated under the Ohio Emergency Planning and Community Right-to-Know regulations (Ohio Revised Code 37-50), which mirrors the federal law. Appropriate information will have to be submitted to the Ohio Environmental Protection Agency.

Acute exposure to vanadium pentoxide can cause nausea, vomiting, nervous system malfunction, and respiratory irritation. Chronic exposure can cause pale skin, anemia, green tongue, and nervous system malfunction. A workplace threshold limit value of 0.05 mg/m^3 for dust and fumes has been adopted by the American Conference of Governmental Industrial Hygienists (ACGIH, 1988). The environmental toxicity of vanadium pentoxide has not been extensively studied. Aquatic toxicity testing indicates that vanadium pentoxide has a moderate toxic effect. The acute (short-term) aquatic toxicity to brook trout ranges from 17 to 20 ppm. Chronic (long-term) aquatic toxicity levels are on the order of 2 to 12 ppm (Ernst et al., 1987).

Currently, the Niles Station is handling both ammonia and sulfuric acid. A Material Safety Data Sheet (MSDS) for each material has been prepared and submitted to local agencies. The demonstration unit will handle both of these materials in a separate facility and will duplicate Niles on-site storage and handling procedures and confirm that they are adequate.

Community Right to Know provisions of the Superfund Amendment and Reauthorization Act (SARA) require facilities to complete the MSDS and submit copies to State and Local Emergency Planning Commissions (LEPC) and the local fire department. Additionally, facilities must submit a tier-one or tier-two Emergency and Hazardous Chemical Inventory Form to the same agencies and departments annually. Immediate verbal notification of any release of hazardous substances must be given to Local and State Emergency Planning Commissions. Follow-up written notification must be made within 24 hours on response actions taken and status of release.

The SARA requirements (Community Right to Know) for ammonia and sulfuric acid and vanadium pentoxide are as follows:

	Reportable Quantity (RQ) (any release) Pounds	Threshold Planning Quantities (TPQ) (notify LEPC) Pounds
Ammonia	100	500
Sulfur (i.e., Acid)	1000	1,000
Vanadium Pentoxide	1000	100 (<100 microns) 10,000 (solid)

Ammonia and Sulfuric Acid

Since ammonia and sulfuric acid are already in use at the Niles plant site in quantities exceeding the TPQ, it will be necessary to:

- o Confirm that Ohio Edison has supplied information to the LEPC (Local Emergency Planning Committee) and other related groups.

- Review Ohio Edison's plan for spills, etc. Determine what action (if any) is needed to cover the increased quantities of these materials.

Vanadium Pentoxide (Reportable Releases)

The maximum yearly screening discharge of 353 lbs is well below the RQ (Reportable Quantity) of 1000 lbs.

When the project operating test phase is complete, and if the unit does not continue to operate, removal of the catalyst will exceed the RQ. Therefore, at that time notification of the LEPC will be made. In that case, the expected removal (not an accidental release) of V_2O_5 from the DeSOx and DeNOx reactors in the form of catalyst is calculated to be approximately 7,300 lbs total V_2O_5 in the total quantity of catalyst (118,000 lbs) removed from the system.

Currently the jobsite safety procedures follow the OSHA requirements. OSHA requirements for storage and handling of ammonia are itemized in 29 CFR 1910.111 and are summarized below:

Storage vessels must meet appropriate specifications and be acceptably tested. Vessel must be located in a safe place that is regularly maintained. Pumps and all appurtenances to vessel must be designed for maximum working pressure. Pumps, piping and fittings must be of suitable material for ammonia application. Pressure gauges and safety relief devices must be provided along with face masks. Employees must be properly trained.

The storage tank for sulfuric acid shall be provided with a dike with sufficient volumetric capacity to contain the greatest amount of liquid that can be released from a full tank. Walls shall be liquid tight, of compatible material and able to withstand a full hydrostatic head. A neutralizing agent such as lime shall be provided in the event of accidental spills. Storage tank shall be located to minimize the possibility of contamination of water wells from a spill.

2.2 ALTERNATIVES

2.2.1 No-Action Alternative

A primary goal of the DOE ICCT program is to demonstrate the benefits of sulfur dioxide and nitrogen oxides emission reduction through the use of innovative, cost-effective technologies on high-sulfur coal-fired boilers. Under the no-action alternative, the project would not receive funding, and consequently could not demonstrate commercial readiness of the WSA-SNOX technology in the U.S. Operation of the Ohio Edison Niles plant would continue as it does currently.

2.2.2 Alternative Technologies

The ICCT PEIA (DOE, 1988) provides a comparison of alternative conventional and advanced flue-gas desulfurization processes. In the PEIA, environmental characteristics for various proposed ICCT processes are described and evaluated.

Methods of sulfur dioxide or nitrogen oxide control currently available or being tested are difficult to apply to cyclone-fired boilers. Cyclone-fired boilers reject most coal ash from the furnace bottom, and this design produces relatively low fly ash loading in the convective section and ESP. Therefore, they are not readily compatible with sorbent injection techniques for sulfur dioxide control, which would represent almost one order of magnitude increase in solids throughput. Wet-scrubbing sulfur dioxide could be added; however, its high capital cost and large space requirements are generally incompatible with cyclone boilers, which tend to be older units with short remaining lifetimes that have limited available adjoining space. The WSA-SNOX process has significant advantages over commercially available technologies that include the following:

- ability to utilize a wide range of coal types
- high sulfur dioxide and nitrogen oxide removal performance
- essential elimination of particulate matter from flue gas
- low capital and operating costs
- low heat rate
- applicability to wide range of power plants
- adaptability to modular fabrication
- adaptability to various scales of application
- minimal environmental impacts

2.2.3 Alternative Sites

In identifying potential sites for the WSA-SNOX demonstration project, Ohio Edison considered existing Ohio Edison sites that were targeted for sulfur dioxide and nitrogen oxide emissions reduction based on the company's overall emissions control compliance strategy. Ohio Edison also analyzed the availability of adequate on-site area to accommodate the proposed project facilities.

Based on these criteria, Ohio Edison identified both the R.E. Burger coal-powered generating facility in Dilles Bottom, Ohio (Burger) and the Niles Plant, as alternative locations for the WSA-SNOX demonstration project. The Ohio Edison Niles plant, however, was chosen for the following technical, environmental, and logistical reasons.

Ohio Edison Niles Unit No. 2 maintains a higher operating capacity than the Burger plant; therefore, a larger quantity of flue gas will be readily available for treatment. The Ohio Edison Niles plant site also offers greater space for construction of the project facilities. Utilities required for construction and operation of the system are readily available at the Niles plant.

The Ohio Edison Niles plant is situated in a region with high unemployment caused by a decline in heavy industry (predominantly steel manufacturers in the area surrounding Youngstown, Ohio). Therefore, the currently underutilized skilled and unskilled labor forces should be available for project construction.

Unit No. 2 at the Ohio Edison Niles plant is a 108-MW pre-New Source Performance Standards (NSPS) coal-fired utility boiler that fires high-sulfur coal from Ohio and western Pennsylvania. Unit No. 2 represents the boiler type that is a focus of the DOE program to develop clean-coal technologies. Cyclone-fired boilers, concentrated in the Midwest, contribute in the production of air pollutants suspected of causing acid rain. These boilers account for only 8 percent of total capacity of the U.S.; however, they produce approximately 18 percent of the nitrogen oxides. Additionally, these boilers use high-sulfur, low-fusion-point midwestern coal that cannot be fired satisfactorily in other boiler types. Therefore, sale of midwestern coal would be restricted and coal mining in the Midwest would decrease significantly.

Reduction of nitrogen oxide emissions of Ohio Edison Niles Unit No. 2 will benefit local air quality. Ohio Edison Niles is in a nonattainment area for ozone, for which nitrogen oxides are a precursor. Therefore, reduction in nitrogen oxide emissions from a utility boiler would be of particular air quality significance in this area.

Use of the Ohio Edison Niles plant is supported by Ohio Edison, the State of Ohio, and the local coal industry, all of which should benefit from a low-cost method of suppressing acidic (i.e., sulfur dioxide and/or nitrogen oxides) emissions if acid rain legislation is promulgated.

3.0 EXISTING ENVIRONMENT

3.1 ATMOSPHERIC RESOURCES

3.1.1 Local Climate

The area in which the Ohio Edison Niles plant is situated is frequently subjected to Canadian air masses that are modified over Lake Erie, approximately 50 miles to the north. As a result, cloudiness prevails, particularly from November to April. Persistent cloudiness and intermittent snow flurries characterize the winter months. Temperatures rarely reach extreme highs during the summer months; however, high humidity tends to accentuate the temperature. Precipitation distribution is somewhat uniform throughout the year. Destructive storms and tornadoes are not common. Table 3-1 summarizes temperature and precipitation data for the closest meteorological station (i.e., Youngstown Municipal Airport). Figure 3-1 is a wind rose from the same station for the year 1988. Wind roses for years 1983 through 1987 are presented in Appendix B. The Youngstown Airport is 8 miles to the north of Youngstown and 8 miles to the north northeast of the Ohio Edison site. The anemometer is located at an height of 20 feet above ground level or an elevation of 1178 feet.

TABLE 3-1
YOUNGSTOWN TEMPERATURE AND PRECIPITATION DATA
(1943 THROUGH 1987)

ENVIRONMENTAL INFORMATION VOLUME
WSA-SNOX DEMONSTRATION PROJECT

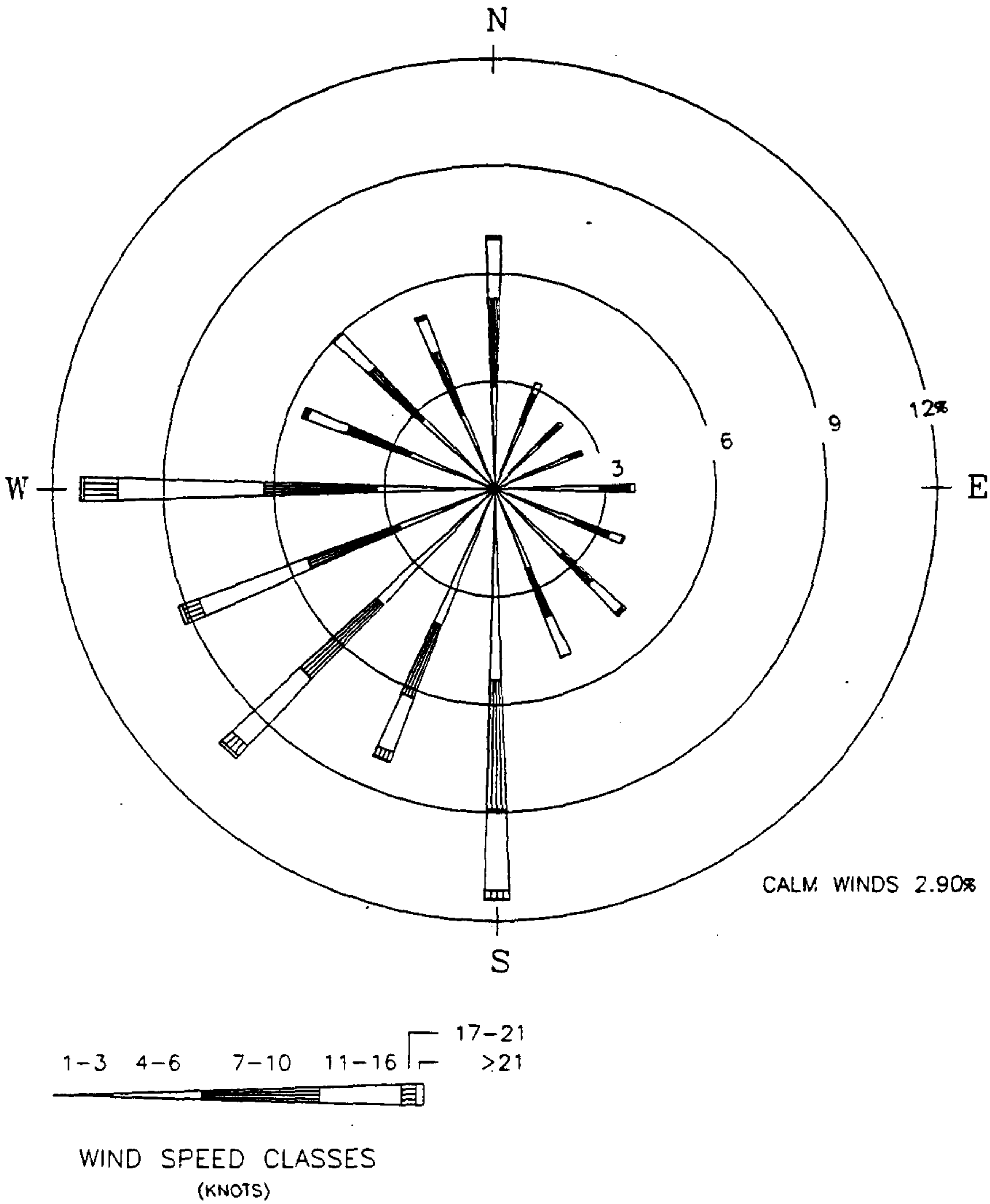
	TEMPERATURE AVERAGE DAILY F°		PRECIPITATION		
MONTH	MAXIMUM	MINIMUM	AVERAGE RAIN (inches)[a]	AVERAGE SNOWFALL (inches)	AVERAGE WIND SPEED (mph)
January	31.8	17.2	2.69	13.2	11.7
February	34.7	18.7	2.24	10.9	11.3
March	44.9	26.9	3.30	10.7	11.5
April	58.1	37.0	3.44	2.6	11.1
May	69.0	46.4	3.71	0.1	9.6
June	77.8	55.2	3.79	0.0	8.6
July	81.6	59.3	3.93	0.0	7.8
August	80.1	58.2	3.38	0.0	7.5
September	73.3	51.7	3.18	T	8.2
October	61.9	41.9	2.61	0.4	9.3
November	48.1	33.0	3.08	6.0	11.0
December	36.3	22.8	2.78	12.6	11.5
Year	58.1	39.0	38.15	56.5	9.9

Notes:

[a] Water equivalent
[b] Average using years 1951-1980

Source:

National Oceanic and Atmospheric Administration, 1987.



NOTES: DIAGRAM OF THE FREQUENCY OF OCCURRENCE FOR EACH WIND DIRECTION. WIND DIRECTION IS THE DIRECTION FROM WHICH THE WIND IS BLOWING.
EXAMPLE - WIND IS BLOWING FROM THE NORTH 7.0 PERCENT OF THE TIME.

SOURCE: STATION NO. 14852
YOUNGSTOWN, OHIO
PERIOD: 1988

FIGURE 3-1
WINDROSE
WSA-SNOX DEMONSTRATION PROJECT
OHIO EDISON NILES STATION
NILES, OHIO

C-E Environmental, Inc.

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3.1.2 Ambient Air Quality

Air resources comprise existing and potential future air quality uses. Existing and future air quality are evaluated using the USEPA-established National Ambient Air Quality Standards (NAAQS).

3.1.2.1 National Ambient Air Quality Standards. The NAAQS were initially conceived in the criteria documents prepared as a result of the Clean Air Act of 1967. The Clean Air Act Amendments of 1970 required USEPA to establish primary standards to protect public health and secondary standards to protect human welfare. USEPA originally established NAAQS for six criteria pollutants in 1971: sulfur dioxide, particulate matter, nitrogen oxides, carbon monoxide, hydrocarbons, and photochemical oxidants (i.e., ozone). Since 1971, the hydrocarbon standard changed to a guideline, and in 1978, a lead standard was established. In 1979, chemical designation of photochemical oxidants changed to ozone. Current NAAQS are shown in Table 3-2.

To implement the standards, each state submitted a State Implementation Plan (SIP) to the USEPA for approval. The area of each was divided into air quality control regions (AQCRs) based on regional development, industry, and air quality potential. Each AQCR was initially designated as attainment or nonattainment for a criteria pollutant, based on measured or modeled air quality in the region. Attainment areas had air quality equal to or better than the NAAQS. The SIP demonstrated how the state planned to reach attainment in all AQCRs for all criteria pollutants. The intent of the Clean Air Act Amendments was for

TABLE 3-2
NATIONAL AMBIENT AIR QUALITY STANDARDS
AND LOCAL MONITORING STATION RESULTS

ENVIRONMENTAL INFORMATION VOLUME
WSA-SNOX DEMONSTRATION PROJECT

POLLUTANT	AVERAGING TIME	PRIMARY STANDARDS $\mu g/m^3$ [a]	PRIMARY STANDARDS ppm[b]	SECONDARY STANDARDS $\mu g/m^3$ [a]	SECONDARY STANDARDS ppm[b]	MONITORING STATION	HIGHEST CONCENTRATION	ATTAINMENT DESIGNATION
Sulfur Dioxide	Annual	80	0.03			39-155-2001[f]	20 $\mu g/m^3$	Attainment
	24-hour[c]	365	0.14			39-155-2001[f]	102 $\mu g/m^3$	
	3-hour			1,300	0.5	39-155-2001[f]	262 $\mu g/m^3$	
Total Suspended Particulates	Annual[d]	75	--	60	--	39-155-0004[f]	52 $\mu g/m^3$	Secondary
	24-hour[c]	260	--	150	--	39-155-0001[f]	158 $\mu g/m^3$	Nonattainment
Suspended Particulates <10 microns (PM10)	Annual	50				39-099-0006[g]	33 $\mu g/m^3$	
	24-hour	150				39-099-0006[g]	111 $\mu g/m^3$	
Carbon Monoxide	8-hour[c]	10,000	9.0	10,000	9.0	39-099-3001[g]	4.3 ppm	Attainment
	1-hour	40,000	35.0	40,000	35.0	39-099-3001[g]	8.0 ppm	
Nitrogen Oxides	Annual	100	0.05	100	0.05	39-035-0033[h]	0.0314 ppm	Attainment
Ozone	1-hour[c]	240	0.12	240	0.12	39-099-0009[g]	0.128 ppm	Nonattainment
Nonmethane Hydrocarbons (6-9 am)[e]	3-hour[c]	160	0.24	160	0.24			
Lead	Calendar quarter	1.5						

NOTES:

[a] Micrograms per cubic meter
[b] Parts per million
[c] Not to be exceeded more than once per year
[d] Geometric mean
[e] Guideline for assuring compliance with standards for photochemical oxidants
[f] Trumbull County, Ohio
[g] Mahoning County, Ohio
[h] City of Cleveland, Ohio

SOURCE:

Ohio Environmental Protection Agency, 1989

AQCRs to be in compliance with the NAAQS for all criteria pollutants by 1978. Compliance has been achieved for many areas and pollutants; however, some areas are not in compliance with ambient standards, particularly the ambient standard for ozone.

Areas in compliance were limited in the amount of incremental pollution that a new source could add to the existing air quality. Allowable increments were regulated under the USEPA Prevention of Significant Deterioration program, which was intended to keep attainment areas in compliance. The USEPA Emission Offset policy limited nonattainment areas in the net increase of new air pollution, requiring new source emissions to be more than offset by decreases in other source emissions.

3.1.2.2 New Source Performance Standards. To further ensure that the NAAQS were achieved, the USEPA established allowable emission rates from new sources, referred to as NSPS. Standards were established for criteria pollutants from major sources such as power plants. Each state adopted similar or more stringent emission limitations as part of its SIP. Most NSPS were based on the type of fuel or raw material. The limitations included particulate matter, sulfur dioxide, and nitrogen oxide emissions, as shown in Table 3-3.

3.1.3 Existing Air Quality

The Ohio EPA has designated 14 AQCRs in the state. AQCR 178, Northwest Pennsylvania-Youngstown, includes Niles and Trumbull counties. Attainment

TABLE 3-3
NEW SOURCE PERFORMANCE STANDARDS
FOR UTILITY UNITS BETWEEN 100 AND 250 MMBTU/HR

ENVIRONMENTAL INFORMATION VOLUME
WSA-SNOX DEMONSTRATION PROJECT

	EMISSION LIMITATION (lb/MMBtu)		
FUEL	PARTICULATE MATTER	SULFUR DIOXIDE	NITROGEN OXIDES*
Solid			
Coal	0.05	1.2 and 90% removal	0.5-0.7
Energizing Technologies	--	0.6 and 50% removal	--

*Pulverized Coal	0.7
Spreader Stoker	0.6
Mass Feed Stoker	0.5
Coal-Derived Fuels	0.5

designations for Trumbull county are shown in Table 3-2. Trumbull County is classified as attainment for sulfur dioxide, nitrogen dioxide, carbon monoxide, and lead, and nonattainment for ozone and for secondary standard for total suspended particulates (TSP).

On July 1, 1987, USEPA designated inhalable particulate matter (PM_{10}) as the indicator for particulate matter pollution, replacing TSP. PM_{10} is particulate matter less than or equal to 10 micrometers aerodynamic diameter. Trumbull County is currently designated as a Group II region, where PM_{10} concentrations are believed to have a 20- to 95-percent probability of exceeding PM_{10} standards.

The attainment status of the area in and around the Ohio Edison Niles plant means that the air quality is better than or equal to the NAAQS for five of six criteria pollutants. Ozone was the sole criteria pollutant classified as nonattainment. Hydrocarbons are not designated because this pollutant category is solely a guideline.

Ohio EPA operates seven air quality monitoring stations in Trumbull County. Three sites monitor for TSP only, two sites monitor TSP and sulfur dioxide, one site for sulfur dioxide only, and one site for PM_{10}. Eleven air quality monitoring stations are operated in neighboring Mahoning County. Six sites monitor for TSP, one site for sulfur dioxide, one site for ozone, one site for carbon monoxide, one site for lead, and one site for PM_{10}. Summaries of 1988 maximum concentrations (i.e., the most recent year available) for Trumbull

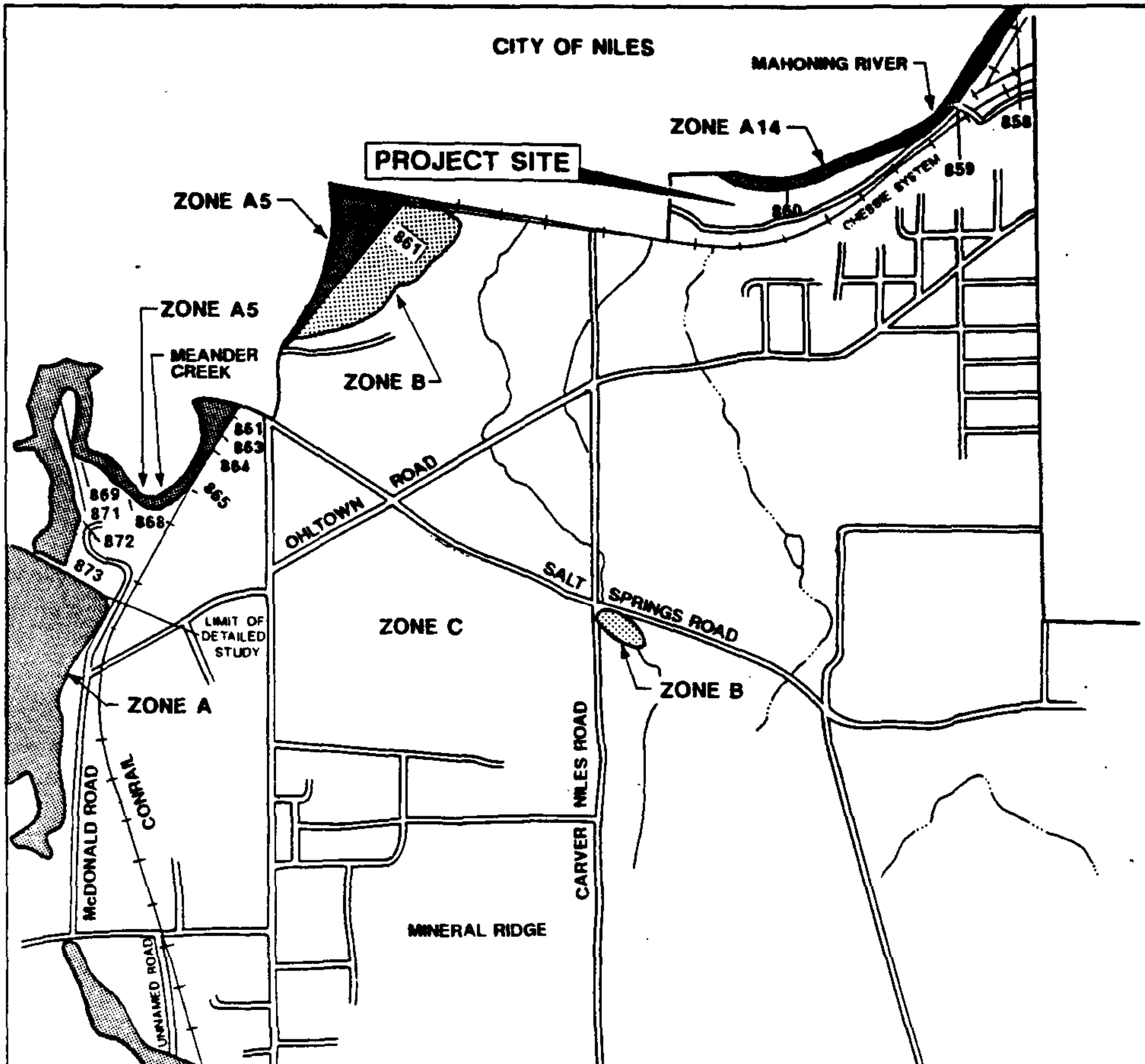
County monitoring stations are in Table 3-2. Where Trumbull County data were not available, Mahoning County data were used. Nitrogen oxide data was not available in either case; therefore, data from the City of Cleveland was used. The results from the monitoring sites confirm the attainment designation with the NAAQS.

3.2 LAND RESOURCES

The Ohio Edison Niles plant site is located in the northern portion of the Allegheny Plateau. Underlying the region are almost horizontal sandstone and shale beds of Mississippian and Pennsylvanian ages found at depths ranging from 800 to 1,200 feet. Old valleys are cut below the general bedrock surface. The principal ancient valleys coincide with the current valleys of Pymatuning Creek, Mosquito Creek, and Grand River.

Glacial and alluvial river deposits (from less than 1 to approximately 200 feet deep) cover most of Trumbull County. Surface materials in the western half of the county consist primarily of Hirim Till. The till, which is typically rich in clay with few cobbles and very few boulders, is rarely found over 10 and in many places less than 5 feet thick.

Surface materials around the site area consist primarily of Hirim Till glacial deposits. However, the ash-settling pond is situated in an area underlain with alluvial river deposits. The surface of the Ohio Edison Niles site is generally



SOURCE FEDERAL EMERGENCY MANAGEMENT AGENCY, FLOOD INSURANCE RATE MAP GIRARD OHIO SEPTEMBER 29 1978 PANEL No.3905350200 B

LEGEND

ZONE A ZONE B

ZONE DESIGNATIONS

ZONE A	AREAS OF 100-YEAR FLOOD; BASE FLOOD ELEVATIONS AND FLOOD HAZARD FACTORS NOT DETERMINED.
ZONE A1 - 30	AREAS OF 100-YEAR FLOOD; BASE FLOOD ELEVATIONS AND FLOOD HAZARD FACTORS DETERMINED.
ZONE B	AREAS BETWEEN LIMITS OF THE 100-YEAR FLOOD AND 500-YEAR FLOOD; OR CERTAIN AREAS SUBJECT TO 100-YEAR FLOODING WITH AVERAGE DEPTHS LESS THAN ONE (1) FOOT OR WHERE THE CONTRIBUTING DRAINAGE AREA IS LESS THAN ONE SQUARE MILE; OR AREAS PROTECTED BY LEVEES FROM THE BASE FLOOD. (MEDIUM SHADING)
ZONE C	AREAS OF MINIMAL FLOODING. (NO SHADING)
860	MEAN ELEVATION ABOVE SEA LEVEL

APPROXIMATE SCALE

0 1000 2000 FEET

FIGURE 3-2
FLOOD ZONES IN VICINITY OF NILES STATION
WSA-SNOX DEMONSTRATION PROJECT
OHIO EDISON NILES STATION
NILES, OHIO

C-E Environmental, Inc.

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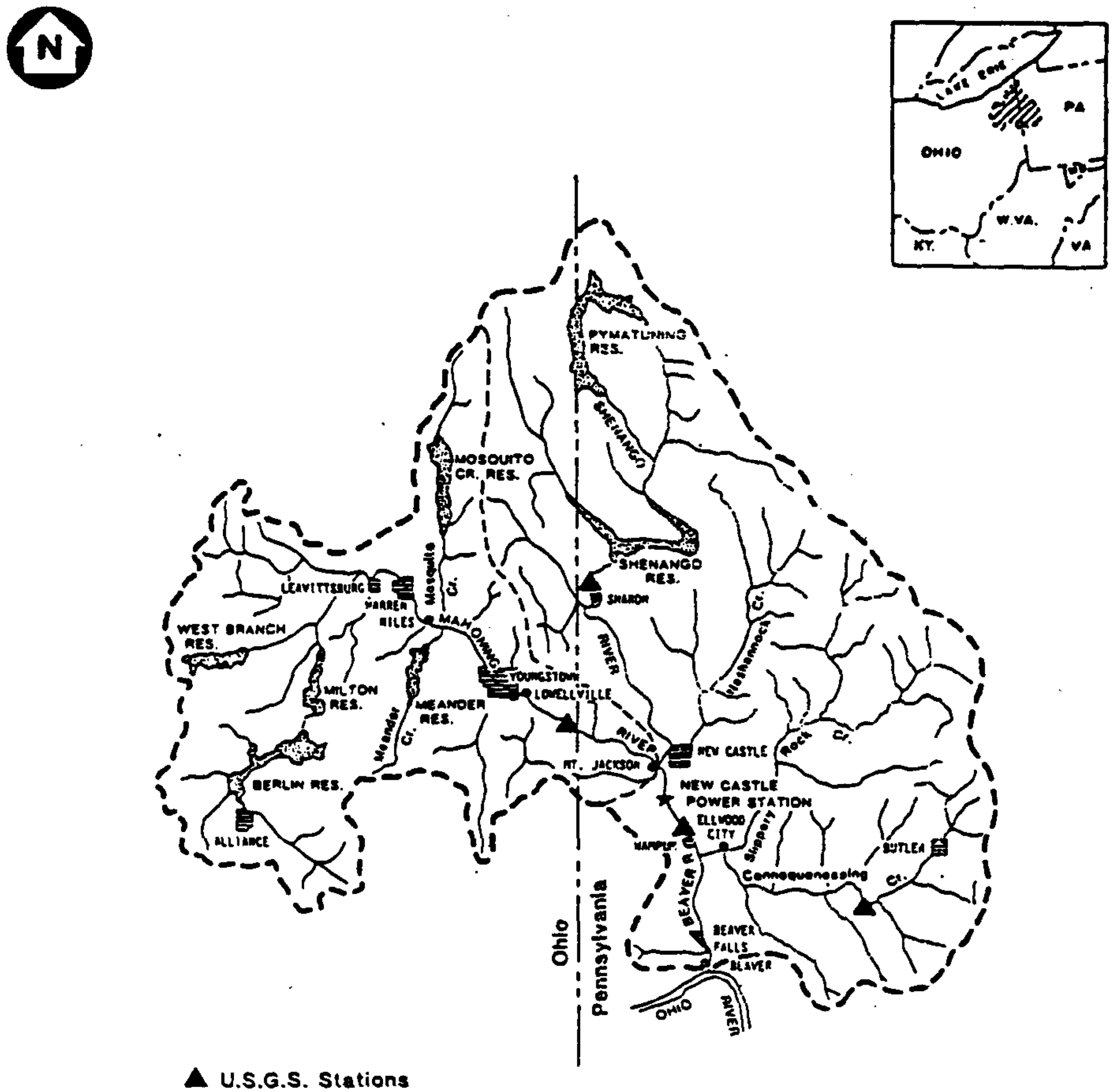
level and has been disturbed over the past 35 years by the development of the plant complex. Much of the site is occupied by buildings or other impervious or gravel surfaces.

Flood hazard areas do not encroach significantly on the power plant site. Figure 3-2 shows the relevant portion of the Flood Insurance Rate Map published by the Federal Emergency Management Agency, 1978. Zone A14, the 100-year flood-prone area with a 1-percent annual flooding probability, extends onto the low-lying areas of the Ohio Edison Niles plant site directly adjacent to the river shore. Portions of the site along the Mahoning River and the ash ponds are located in floodplain areas; however the main plant facility lies 15 feet above the calculated 100-year flood elevation of 860 feet above mean sea level. The existing ash ponds are also bermed approximately 18 feet above the calculated 100-year flood elevation. The berms surrounding the ash pond area are constructed of native low-permeability soils and are compacted to prevent rupture during high water periods (Energy and Environmental Management, Inc., 1986).

3.3 WATER RESOURCES

3.3.1 Surface Water

The Ohio Edison Niles power plant is located along the southern bank of the Mahoning River, approximately 30 miles above the confluence of the Mahoning and



SOURCE: ENERGY AND ENVIRONMENTAL MANAGEMENT, INC., 1986.

SCALE

0 15 30 MILES

FIGURE 3-3
DRAINAGE PATTERN AND ACTIVE FLOOD CONTROL RESERVOIRS IN THE BEAVER RIVER BASIN
WSA-SNOX DEMONSTRATION PROJECT
OHIO EDISON NILES STATION
NILES, OHIO

C-E Environmental, Inc.

3890-80

Shenango Rivers, which form the Beaver River. At the confluence, the Mahoning River drains an estimated 680 square miles of eastern Ohio. Beaver River Basin and the Mahoning River subbasin are shown in Figure 3-3.

Milton Reservoir was first constructed on the Beaver watershed at Pricetown, Ohio, in 1916 to augment flow of the Mahoning River for industrial purposes in the Warren and Youngstown vicinity (U.S. Department of Interior [DOI], 1976). Since 1919, four additional reservoirs have been constructed that ultimately affect the flow of the Mahoning River. The U.S. Army Corps of Engineers (USACE) maintains a schedule for regulating the Mahoning River flow at Youngstown. Low flows have been shifted from the fall to the winter by regulating releases from the reservoirs. A minimum maintained flow of 225 cubic feet per second (cfs) is guaranteed at Youngstown from November through March. The highest minimum flows (i.e., 395, 470, and 445 cfs) are scheduled to be maintained during the summer months.

The Mahoning River is designated as a warm water aquatic life habitat, an industrial and agricultural water supply, and for primary contact recreation use under Ohio water quality standards. The Mahoning River, downstream from Warren, has experienced severe degradation from wastewaters containing metals and organic compounds (Ohio EPA, 1986). For the study, Ohio EPA examined several years of sampling data collected from various locations along the Mahoning River and concluded that the most significant point sources impacting water quality were steel-making facilities near Warren and Youngstown, coking operations, and municipal wastewater treatment plants (Energy and Environmental Management, Inc., 1986).

Ohio EPA analyzed samples collected from July to September 1969-1983 from the continuous dissolved oxygen (DO) and temperature monitors located at Leavittsburg (upstream of Warren), and at Lowellville near the Ohio-Pennsylvania state line (Ohio EPA, 1986). Sample results revealed the influence of river flow, steel production and loadings of oxygen-demanding wastewater. Results at Leavittsburg confirmed the results of the 1980 grab-sampling that showed good background water quality in the Mahoning River upstream from the urban-industrialized areas. No violations of average water quality standard for DO or the 85°F maximum for temperature were observed at Leavittsburg over the 15-year period. Numerous violations of both the DO and temperature standards were observed at the Lowellville monitor downstream from the urban/industrialized area in Youngstown. According to Ohio EPA, the frequency of violation of both DO and temperature standards was statistically related to mean river flow and raw steel production, but not to the mean heat reject rate British thermal unit per hour (Btu/hr) measured at the Ohio Edison Niles power plant (Ohio EPA, 1986). During the 15-year period, the frequency of violation of both DO and temperature standards declined. The chemical and physical impact of industrial and municipal point sources was evident in the contamination of bank soil and bottom sediment samples collected downstream from Warren (Ohio EPA, 1986).

DO levels measured upriver of the Ohio Edison Niles Plant from 1980 to 1984 are presented in Table 3-4. Table 3-5 summarizes statistics of ambient water temperature measured daily at the Ohio Edison Niles Plant intake from 1983 through 1985. DO levels upriver of the plant were below the 5.0 milligram per

TABLE 3-4

DISSOLVED OXYGEN DATA FOR THE MAHONING RIVER

Date	Dissolved Oxygen (ppm) Minimum	Average	Maximum
September 4, 1980	10.0	10.2	10.4
October 3, 1980	7.6	7.7	7.8
July 30, 1981	4.1	4.2	4.3
August 12, 1981	3.3	3.4	3.4
July 19, 1982	3.0	3.2	3.3
August 5, 1982	3.3	3.6	3.8
August 17, 1982	4.1	4.1	4.2
July 19, 1983	3.8	4.0	4.4
August 13, 1983	3.0	3.1	3.2
July 25, 1984	3.9	4.1	4.2
August 10, 1984	3.0	3.2	3.3

* COLLECTED ABOVE THE NILES POWER STATION BY OHIO EDISON.

SOURCE: ENERGY AND ENVIRONMENTAL MANAGEMENT, INC., 1986.

TABLE 3-5

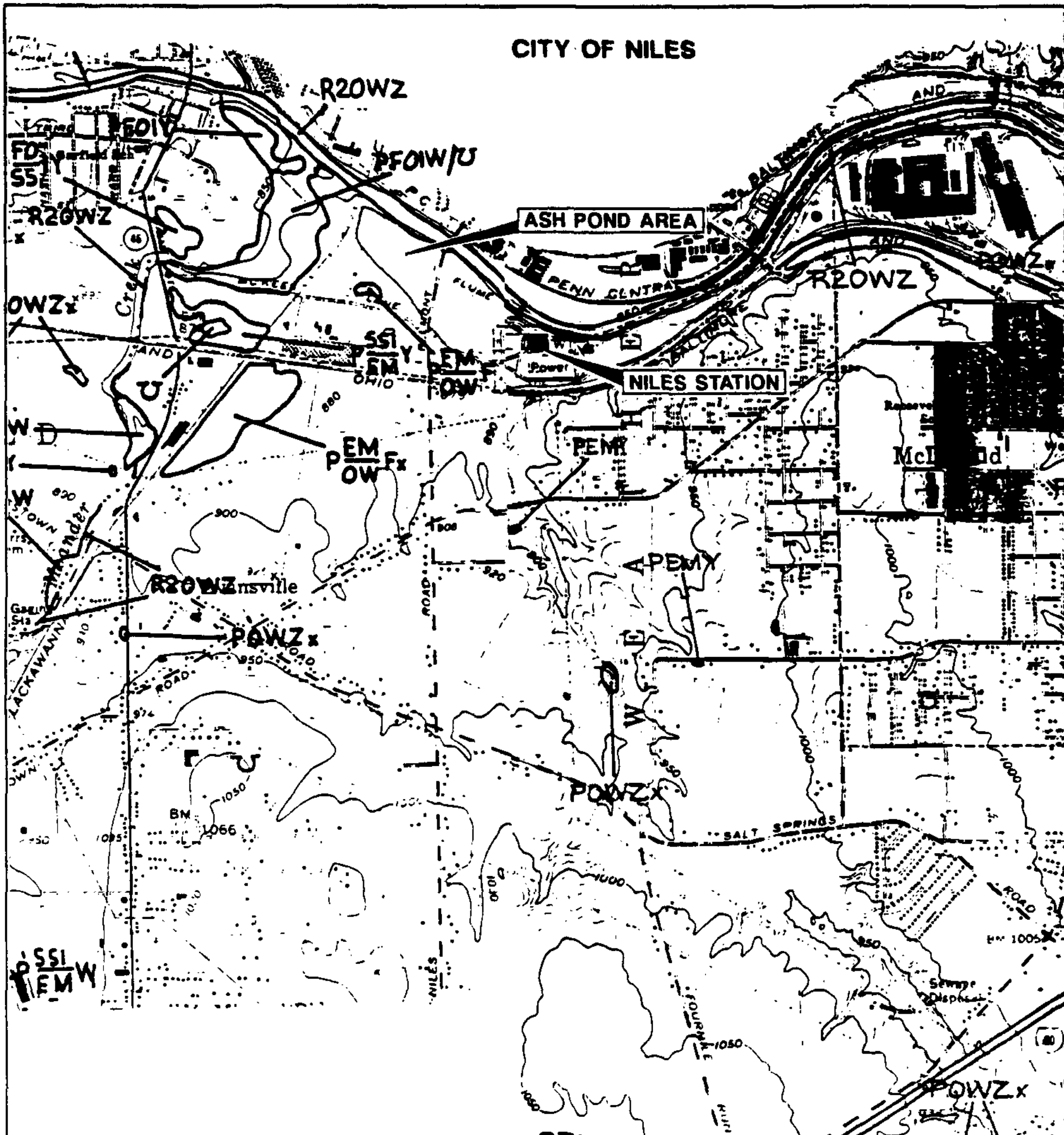
MAHONING RIVER AMBIENT TEMPERATURE DATA, 1983 THROUGH 1985

	jan	feb	mar	apr	may	jun	jul	aug	sep	oct	nov	dec
mean	37.7	39.0	44.1	53.1	63.5	73.5	77.1	77.4	71.9	62.9	49.6	39.2
std. dev.	2.5	3.2	5.7	7.7	6.0	4.6	2.7	2.4	4.0	3.0	4.0	4.0
skewness	-1.4	1.1	.0	1.0	.5	-.3	0	0	.3	.2	.2	-.1
kurtosis	12.6	3.7	3.2	2.9	2.2	2.2	2.5	2.4	2.3	3.9	2.4	1.9
distribution (%)												
0	33.5	35.9	35.0	42.5	53.6	63.2	70.6	72.3	61.9	53.0	41.2	32.5
5	34.0	36.3	36.7	44.6	55.1	65.2	72.7	73.3	65.3	56.7	41.6	33.0
10	35.5	36.6	37.3	46.0	56.0	66.9	73.7	74.3	66.2	57.7	43.1	33.6
20	36.2	37.2	39.1	46.0	57.7	69.3	74.9	75.1	67.0	60.1	45.1	34.5
30	36.6	37.7	41.0	47.9	59.5	70.2	75.4	75.0	69.0	61.1	46.7	35.9
40	36.9	38.2	41.7	49.0	60.5	72.1	76.3	76.9	70.1	62.2	47.3	38.9
50	37.4	38.6	42.7	50.3	61.9	74.1	77.0	77.6	71.2	63.0	49.1	39.0
60	38.0	39.0	44.1	51.9	64.5	75.0	77.6	78.0	72.4	64.0	51.0	41.1
70	38.4	40.9	45.0	55.2	66.0	76.3	78.4	78.0	73.5	64.7	52.9	41.4
80	39.4	41.9	49.1	58.5	69.3	77.6	79.4	79.3	76.6	65.2	53.0	42.2
90	40.5	44.6	52.0	66.9	72.1	78.9	80.9	80.4	79.2	67.0	55.2	44.5
95	41.2	46.2	55.1	69.0	74.9	80.3	81.6	81.7	80.3	68.0	57.2	45.3
100	44.3	50.6	61.0	72.2	76.3	82.0	82.5	82.9	82.1	75.4	62.4	47.3

* 0% IS MINIMUM DAILY AVERAGE VALUE, 50% IS MEDIAN VALUE AND 100% IS MAXIMUM DAILY AVERAGE VALUE.

* TEMPERATURE RECORDED NEAR THE NILES POWER STATION.

SOURCE: ENERGY AND ENVIRONMENTAL MANAGEMENT, INC., 1986.



SOURCE: U.S. DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. APRIL 1977.
NATIONAL WETLANDS INVENTORY, GIRARD, OHIO.

N

SCALE
0 2000 4000 FEET

FIGURE 3-4
WETLANDS IN VICINITY OF NILES STATION
WSA-SNOX DEMONSTRATION PROJECT
OHIO EDISON NILES STATION
NILES, OHIO

C-E Environmental, Inc.

5890-00

LEGEND

SYSTEM P — PALUSTRINE

CLASS	RB — ROCK BOTTOM	UB — UNCONSOLIDATED BOTTOM	AB — AQUATIC BED	US — UNCONSOLIDATED SHORE	ML — MOSS-LICHEN	EM — EMERGENT	SS — SCRUB-SHRUB	FO — FORESTED	OW — *OPEN WATER/ Unknown Bottom*
Subclass	1 Bedrock 2 Rubble	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic	1 Algal 2 Aquatic Moss 3 Rooted Vascular 4 Floating Vascular 5 *Unknown Submergent* 6 *Unknown Surface*	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated	1 Moss 2 Lichen	1 Persistent 2 Nonpersistent	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 *Deciduous* 7 *Evergreen*	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 *Deciduous* 7 *Evergreen*	

MODIFIERS

In order to more adequately describe wetland and deepwater habitats one or more of the water regime, water chemistry, soil, or special modifiers may be applied at the class or lower level in the hierarchy. The farmed modifier may also be applied to the ecological system.

WATER REGIME			WATER CHEMISTRY			SOIL	SPECIAL MODIFIERS	
Non-Tidal		**Tidal**	***Coastal Halinity**	**Inland Salinity**	**pH Modifiers for all Fresh Water**			
A Temporarily Flooded B Saturated C Seasonally Flooded D *Seasonally Flooded-Well Drained* E *Seasonally Flooded-Saturated* F Semipermanently Flooded G Intermittently Exposed	H Permanently Flooded J Intermittently Flooded K Artificially Flooded W Intermittently Flooded-Temporary Y Saturated/Semipermanent/Seasonal Z Intermittently Exposed/Permanent U *Unknown*	K *Artificially Flooded* L Subtidal M Irregularly Exposed N Regularly Flooded P Irregularly Flooded *S Temporary-Tidal *R Seasonal-Tidal *T Semipermanent-Tidal *V Permanent-Tidal U *Unknown* *These water regimes are only used in tidally influenced, freshwater systems	1 Hyperhaline 2 Euhaline 3 Mixohaline *(Brackish)* 4 Polyhaline 5 Mesohaline 6 Oligohaline 0 Fresh	7 Hypersaline 8 Eusaline 9 Mixosaline 0 Fresh	a Acid t Circumneutral i Alkaline	g Organic n Mineral	b *Beaver* d *Partially Drained/Ditched* f Farmed	h *Diked/Impounded* r Artificial Substrate s *Spoil* x Excavated

SOURCE: U.S. DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. 1988. NATIONAL WETLANDS INVENTORY, GIRARD, OHIO.

FIGURE 3-4 (CONTINUED)
WETLANDS IN VICINITY OF NILES STATION
WSA-SNOX DEMONSTRATION PROJECT
OHIO EDISON NILES STATION
NILES, OHIO

C-E Environmental, Inc.

5890-00

liter (mg/) standard in nine of 11 surveys. Average monthly water temperatures varied from a low of 37.7°F in January to a high of 77.4°F in August during the three-year period. The maximum daily average temperature was 82.9°F, which occurred in August.

The Mahoning River has not been extensively monitored by the Ohio EPA for other water quality parameters since 1980. Water chemistry data, consisting of one sample per site of either metals or sediments have been collected since 1980. Available data for the Mahoning River from Niles to Youngstown do indicate improvement in the sediment/trace metals results. These data are provided in Appendix D.

The U.S. Fish & Wildlife Service (USFWS) has inventoried and mapped wetlands for Ohio under the National Wetlands Inventory Program. Figure 3-4 shows mapped wetlands in the Ohio Edison Niles power plant site vicinity and describes the wetland classification codes used on the wetlands map. No wetlands areas are indicated on the Ohio Edison Niles site or in the ash pond area. The USFWS maps specifically state that they are not intended to establish geographical scope of any governmental wetlands regulatory program. Each regulatory agency defines and describes wetlands differently. USFWS classifies the ash ponds as artificial diked impoundments or excavations. Ash ponds may support flora and fauna adapted to wetland conditions; however, their original purpose and continuing function is to serve power plants as solid waste settling and disposal facilities. Ash ponds probably are not considered wetlands as defined by USEPA (40 CFR 230.3[t]), USACE (33 CFR 328.3[b]), or Executive Order 11990

("Protection of Wetlands") because they either (1) are not "inundated by surface or groundwater with a frequency and duration sufficient to support a prevalence" of wetland vegetation or aquatic life, or (2) do not "under normal circumstances" support a prevalence of wetland vegetation or aquatic life.

3.3.2 Groundwater

The Mahoning River Valley contains thick deposits of sand and gravel. Groundwater yields from sand and gravel aquifers in the site vicinity are high, generally between 25 to 100 gpm. Based on a review of available well log data obtained from Ohio Department of Natural Resources (ODNR), four water wells are located within a 1-mile radius of the site. One well is located directly north of the plant across the Mahoning River, while the other three wells are situated southeast of the site in a residential area. The groundwater wells are completed into shale, receiving water from overlying sand and gravel deposits. Used for either industrial or residential purposes, these wells yield between 5 to 60 gpm. Groundwater quality data for the site vicinity is not available.

3.4 ECOLOGICAL RESOURCES

3.4.1 Wildlife

Trumbull and Mahoning counties provide abundant habitat for birds, fish and other wildlife. The Mahoning River supports various fish, benthic macro

TABLE 3-6

FISH SPECIES COLLECTED BY OHIO EPA IMMEDIATELY UPRIVER OF THE NILES POWER STATION

Scientific Name	Common Name	1980 07/10	1980 08/26	1980 09/10	1983 08/10	1983 09/09	1983 10/26
CATOSTOMIDAE	Suckers						
Catostomus commersoni	White sucker	-	-	3	2	2	5
CENTRARCHIDAE	Sunfishes						
Lepomis cyanellus	Green sunfish	-	2	7	1	-	-
Lepomis gibbosus	Pumpkinseed	-	-	-	1	-	-
Lepomis macrochirus	Bluegill	1	3	23	-	-	4
Micropterus salmoides	Largemouth bass	-	-	5	3	2	2
Pomoxis annularis	White crappie	1	-	2	5	1	-
CLUPEIDAE	Herring						
Dorosoma cepedianum	Gizzard shad	3	7	-	9	-	2
CYPRINIDAE	Carp and Minnows						
Cyprinus carpio	Carp	-	1	-	1	4	-
Notemigonus crysoleucas	Golden shiner	4	-	3	13	12	6
Pimephales notatus	Bluntnose minnow	-	-	2	-	-	-
Pimephales promelas	Fathead minnow	-	1	-	-	-	-
Semotilus atromaculatus	Creek chub	-	1	-	-	-	-
Umbra limi	Central mudminnow	3	1	6	-	-	-
ESOCIDAE	Pike						
Esox americanus vermiculatus	Grass pickerel	-	-	3	2	4	-
ICTALURIDAE	Catfishes						
Ictalurus natalis	Yellow bullhead	-	-	-	-	2	1
PERCIDAE	Perches						
Perca flavescens	Yellow perch	1	-	-	-	-	-
Stizostedion vitreum	Walleye	-	-	-	1	-	-
	Number of fish	13	16	54	38	27	20
	Number of Species	6	7	9	10	7	6

SOURCE: ENERGY AND ENVIRONMENTAL MANAGEMENT, INC., 1986.

invertebrates, and zooplankton. The Ohio Edison Niles site provides relatively insignificant habitat for wildlife species, and offers limited vegetative cover suitable for some species, primarily along the river shore. The Mahoning River has been designated as a warm water aquatic life habitat. Table 3-6 lists fish species collected by Ohio EPA in 1980 and 1983 upriver of the Ohio Edison Niles plant.

Heavy industry has greatly impacted the Mahoning River and its biota for over a century. Youngstown emerged as a steel center in the 1880s, and by 1900, iron and steel was the principal industry of the Mahoning River Valley. As a result, water quality was degraded in the lower Mahoning, lower Shenango, and Beaver rivers. Discharges from the mills, which carried chemicals and often elevated the temperature of the water, adversely affected aquatic life during periods of low river flow. Other discharges came from oil and gas wells, and domestic sewer outfalls. During this period of industrial development, the aquatic fauna were reduced throughout the entire length of the Beaver and the lower Mahoning rivers (Ortman, 1909).

From 1901 to 1950, industrial degradation of the Beaver River drainage increased. Surface mining of coal resources became an important industry in the drainage basin, with resultant acid drainage and siltation problems. Many deep mines were abandoned after their resources were depleted, and they drained into waterways without control. A positive factor influencing aquatic life in the basin during this period was probably the construction of numerous dams at the headwaters. In contrast to the extensive damming of the rivers in the previous century, which had a devastating effect on the migratory fish fauna, the headwater dams had redeeming characteristics. Major reservoirs on the Mahoning River and Pymatuning Reservoir on the Shenango River supported active warm water fisheries and mitigated downstream effects of degraded water quality by controlled releases of stored water (Energy and Environmental Management, Inc., 1986).

The trend since 1950 has been toward water quality improvement through abatement, municipal sewage treatment, and control of mine drainage. However, despite programs of industrial wastewater and sewage treatment, the water quality in the Mahoning, lower Shenango and Beaver rivers remained poor through 1968. From 1950 through 1964, 37 fish kills were reported in the Mahoning River (Bednar, 1968).

In recent years, industrial activity in the Mahoning River watershed has declined. In 1979, several steel producers in the Youngstown area ceased or reduced operations, and some that remained operational had modernized their water treatment plants. These recent developments contributed to reductions in water temperature and heavy metal content in the lower Mahoning River. Additionally, several municipal sewage treatment plants have upgraded their facilities, reducing the fecal coliform count in the lower Mahoning River. Additional sewage treatment in Warren has improved water quality in the Mahoning River in the Ohio Edison Niles plant vicinity (Energy and Environmental Management, Inc., 1986). ODNR staff indicated that aquatic fauna in the Mahoning River near the power station has responded favorably to the improved water quality.

Since 1975, USEPA has periodically collected and analyzed sediment samples from the Mahoning River. Some recent sediment samples indicated high concentrations of polynuclear aromatic hydrocarbons (PAHs). PAHs are a diverse class of compounds that occur naturally in soot, coal tar pitch volatile compounds, tobacco smoke, petroleum, and cutting oils. They are also associated with certain industrial processes such as creosote treatment of lumber, asphalt, coking operations, and steel production. As a result, in July 1988, the Ohio Department of Health issued an advisory against swimming, wading, or consuming fish in a portion of the Mahoning River extending from the Northwest Bridge Road in Warren to the Pennsylvania border. The Ohio Edison Niles station is located on this portion of the Mahoning River.

In response to requirements to limit the thermal loading to the Mahoning River, Ohio Edison Niles contracted Energy and Environmental Management, Inc., to develop a study outlining an Alternative Thermal Effluent Program, including a plan for load management at the Ohio Edison Niles plant. Load management limits waste heat discharges to the river to levels that will not adversely affect a balanced warm-water aquatic community. The Alternative Thermal Effluent Program was based on temperature criteria to protect selected fish species. Thirty fish species selected by Ohio EPA were considered Representative and Important Species for the Mahoning River near the Ohio Edison Niles plant (Table 3-7). The study assumed that protecting the more thermally sensitive fish (see Table 3-7) would help sustain and propagate a balanced indigenous warm-water aquatic community in the Mahoning River near the Ohio Edison Niles plant (Energy and Environmental Management, Inc., 1986). The study recommended the following criteria:

TABLE 3-7

LIST OF REPRESENTATIVE AND IMPORTANT FISH SPECIES

Species collected by Ohio EPA, 1980-1983*:

Common Name	Scientific Name
Bluegill	*Lepomis macrochirus*
Bluntnose minnow	*Pimephales notatus*
Carp	*Cyprinus carpio*
Central mudminnow	*Umbra limi*
Creek chub	*Semotilus atromaculatus*
Fathead minnow	*Pimephales promelas*
Gizzard shad	*Dorosoma cepedianum*
Golden shiner	*Notemigonus crysoleucas*
Grass pickerel	*Esox americanus vermiculatus*
Green sunfish	*Lepomis cyanellus*
Largemouth bass	*Micropterus salmoides*
Pumpkinseed	*Lepomis gibbosus*
Walleye	*Stizostedion vitreum*
White sucker	*Catostomus commersoni*
White crappie	*Pomoxis annularis*
Yellow bullhead	*Ictalurus natalis*
Yellow perch	*Perca flavescens*

Additional species requested by Ohio EPA, May 13, 1986:

Common Name	Scientific Name
Black crappie	*Pomoxis nigromaculatus*
Brown bullhead	*Ictalurus nebulosus*
Channel catfish	*Ictalurus punctatus*
Golden redhorse	*Moxostoma erythrurum*
Goldfish	*Carassius auratus*
Longear sunfish	*Lepomis megalotis*
Redfin pickerel	*Esox americanus americanus*
Rock bass	*Ambloplites rupestris*
Smallmouth bass	*Micropterus dolomieui*
Spotfin shiner	*Notropis hudsonius*
Spottail shiner	*Notropis spilopterus*
Striped shiner	*Notropis chrysocephalus*
White bass	*Morone chrysops*

* From Table 3-6.

SOURCE: ENERGY AND ENVIRONMENTAL MANAGEMENT, INC., 1986.

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- No single daily average downriver mixed temperature can exceed 92°F.

- No more than 12 single-day occurrences per year of a daily average downriver mixed temperature in excess of 89°F are allowed; these single-day occurrences must be separated by two consecutive days of daily average downriver mixed temperature of less than 89°F.

- No more than 20 occurrences per year of a seven-day moving average downriver mixed temperature in excess of 86.5°F are allowed.

To implement load management at the Ohio Edison Niles plant according to the Alternative Thermal Effluent Program, allowable generation must be determined through a series of calculations. The calculation of daily allowable generation is designed to limit waste heat discharge, based on river flow and temperature data collected upstream of the plant, so that the resulting downriver mixed temperature does not exceed the Alternative Thermal Effluent Program criteria (Energy and Environmental Management, Inc., 1986).

The load management plan was incorporated into the NPDES permit and requires Ohio Edison to perform the following control procedures using 24-hour daily average values:

- determine daily average ambient river temperature (monitored electronically at an on-site U.S. Geological Survey [USGS] gauging station upstream of the plant)

- obtain a flow estimate for the Mahoning River near the plant (monitored electronically at the on-site USGS gauging station upstream of the plant)

- calculate the allowable daily generation by using temperature and flow input data collected from the gauging station

- transmit this load information to the central dispatcher for inclusion in system dispatch for the following day

- operate at or below the allowable daily generation

Load management using the Alternative Thermal Effluent Program usually results in limited power generation at the Ohio Edison Niles plant during the summer months (i.e., June through September).

3.4.2 Vegetation

Despite heavy industrial development along the Mahoning River, approximately 95 percent of the river banks are well vegetated. The majority of the riparian buffer strip exceeds 20 to 50 feet wide and consist mainly of large trees and secondary growth. The Ohio Edison Niles site lacks vegetative cover except for the riparian buffer strip (Ohio EPA). The area of the Ohio Edison Niles site to be disturbed by the WSA-SNOX project, specifically, does not have any vegetative cover.

3.4.3 Endangered or Threatened Species

Table 3-8 lists state-listed endangered or threatened wildlife and plant species that have been identified within 25 miles of the Ohio Edison Niles plant site. According to this ODNR inventory, no state-listed endangered or threatened species are located in the area of the Ohio Edison Niles site (ODNR, Division of Natural Areas and Preserves). No federally listed endangered or threatened species have been noted in Trumbull County by ODNR. Two animal species, the eastern sand darter (Amocrypt pellucida) and Eastern Massasauga (Sistruru catenatus), have been proposed for federal listing; however, additional biological information is needed before a final determination can be made. Neither of the potentially threatened species has been identified in the vicinity of the Ohio Edison Niles site.

3.4.4 Natural Areas

No state parks, natural areas and preserves, or recreational areas are adjacent to the Ohio Edison Niles site. The Ohio Natural Heritage Data Base has identified several state-valued natural areas within 25 miles of the Ohio Edison Niles site. These areas are identified as follows:

- o Poland Municipal Forest. This area, approximately 12 miles southeast of the Ohio Edison Niles site, provides a valuable wildlife habitat and contains two state-endangered plant species, Plantago cordata and Trollius laxus.

TABLE 3-8
ENDANGERED AND THREATENED SPECIES WITHIN 25 MILES OF OHIO EDISON NILES STATION

SPECIAL ANIMALS

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	OHIO STATUS
AMMOCRYPTA PELLUCIDA	EASTERN SAND DARTER	F2	S
CIRCUS CYANEUS	NORTHERN HARRIER		
CLEMMYS GUTTATA	SPOTTED TURTLE		E
HEMIDACTYLIUM SCUTATUM	FOUR-TOED SALAMANDER		E
ICHTHYOMYZON FOSSOR	NORTHERN BROOK LAMPREY		E
ICHTHYOMYZON GREELEYI	MOUNTAIN BROOK LAMPREY		E
IXOBRYCHUS EXILIS	LEAST BITTERN		
PORZANA CAROLINA	SORA		
RALLUS LIMICOLA	VIRGINIA RAIL		
SISTRURUS CATENATUS	EASTERN MASSASAUGA	F2	

SPECIAL PLANTS

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	OHIO STATUS
ACONITUM NOVEBORACENSE	NORTHERN MONKSHOOD	FT	E
ADLUMIA FUNGOSA	MOUNTAIN-FRINGE		T
AGRIMONIA STRIATA	HAIRY AGRIMONY		P
ANCHISTEA VIRGINICA	VIRGINIA CHAIN-FERN		P
ARISAEMA STEWARDSONII	SWAMP JACK-IN-THE-PULPIT		P
BETULA POPULIFOLIA	GRAY BIRCH		P
BOTRYCHIUM MULTIFIDUM	LEATHERY GRAPE-FERN		T
CALLITRICHE TERRESTRIS	AUSTIN'S WATER-STARWORT		P
CALLITRICHE VERNA	WATER-STARWORT		T
CAREX ARCTATA	DROOPING WOOD SEDGE		E
CAREX CEPHALOIDEA	THIN-LEAF SEDGE		T
CAREX FOLLICULATA	LONG SEDGE		P
CAREX GLAUCODEA	BLUE-GREEN SEDGE		P
CAREX LEPTONERVIA	NERVELESS WOOD SEDGE		P
CAREX PALLESCENS	PALE SEDGE		T
CAREX STRAMINEA	STRAW SEDGE		T
CLINTONIA UMBELLULATA	SPECKLED WOOD-LILY		P
CORALLORHIZA MACULATA	SPOTTED CORAL-ROOT		P
CORYDALIS SEMPERVIRENS	ROCK-HARLEQUIN		T
CUSCUTA PENTAGONA	FIVE-ANGLED DODDER		E
CYPERUS ENGELMANNII	ENGELMANN'S UMBRELLA-SEDGE		P
DANTHONIA COMPRESSA	FLATTENED WILD OAT GRASS		T
DESCHAMPSIA FLEXUOSA	CRINKLED HAIRGRASS		T

LEGEND -

- FT FEDERAL THREATENED SPECIES
- F2 SPECIES PROPOSED FOR FEDERAL LISTING
- E STATE ENDANGERED SPECIES
- T STATE THREATENED
- P POTENTIALLY THREATENED
- S SPECIAL CONCERN

SOURCE: OHIO DEPARTMENT NATURAL RESOURCES, OHIO NATURAL HERITAGE DATA SERVICES.

TABLE 3-8 (CONTINUED)

SPECIAL PLANTS

SCIENTIFIC NAME	COMMON NAME	FEDERAL STATUS	OHIO STATUS
DROSERA ROTUNDIFOLIA	ROUND-LEAVED SUNDEW		P
DRYOPTERIS CLINTONIANA	CLINTON'S WOOD FERN		T
ELEOCHARIS ELLIPTICA	YELLOW-SEEDED SPIKERUSH		P
EPILOBIUM STRICTUM	SIMPLE WILLOW-HERB		T
EQUISETUM SYLVATICUM	WOODLAND HORSETAIL		T
ERIOPHORUM VIRGINICUM	TAWNY COTTONGRASS		P
GENTIANA CLAUSA	CLOSED GENTIAN		P
GLYCERIA GRANDIS	TALL MANNA-GRASS		P
GYMNOCARPIUM DRYOPTERIS	OAK FERN		T
HYDROCOTYLE AMERICANA	AMERICAN WATER-PENNYWORT		P
ISOETES ENGELMANNII	APPALACHIAN QUILLWORT		E
JUNCUS PLATYPHYLLUS	FLAT-LEAVED RUSH		T
LARIX LARICINA	TAMARACK		P
LATHYRUS OCHROLEUCUS	YELLOW VETCHLING		T
LECHEA INTERMEDIA	ROUND-FRUITED PINWEED		T
LECHEA LEGGETTII	LEGGETT'S PINWEED		P
LUZULA BULBOSA	SOUTHERN WOODRUSH		E
MELAMPYRUM LINEARE	COW-WHEAT		P
NEMOPANTHUS MUCRONATUS	CATBERRY		P
PANICUM PHILADELPHICUM	PHILADELPHIA PANIC-GRASS		T
PHEGOPTERIS CONNECTILIS	LONG BEECH-FERN		P
PLANTAGO CORDATA	HEART-LEAF PLANTAIN	F2	E
PLATANTHERA ORBICULATA	LARGE ROUND-LEAVED ORCHID		P
PLATANTHERA PSYCODES	SMALL PURPLE FRINGED ORCHID		T
POA LANGUIDA	WEAK SPEAR-GRASS		P
POTAMOGETON SPIRILLUS	SPIRAL PONDWEED		T
POTENTILLA ARGUTA	TALL CINQUEFOIL		E
PYCNANTHEMUM MUTICUM	BLUNT MOUNTAIN-MINT		P
RHODODENDRON NUDIFLORUM VAR. ROSEUM	NORTHERN ROSE AZALEA		P
SELAGINELLA RUPESTRIS	ROCK SPIKEMOSS		E
TROLLIUS LAXUS	SPREADING GLOBE-FLOWER		E
VACCINIUM MACROCARPON	LARGE CRANBERRY		P
VALLISNERIA AMERICANA	EEL-GRASS		P
VERATRUM VIRIDE	WHITE HELLEBORE		P
VIBURNUM ALNIFOLIUM	HOBBLEBUSH		P
VITIS LABRUSCA	NORTHERN FOX GRAPE		P

LEGEND

- FT FEDERAL THREATENED SPECIES
- F2 SPECIES PROPOSED FOR FEDERAL LISTING
- E STATE ENDANGERED SPECIES
- T STATE THREATENED
- P POTENTIALLY THREATENED
- S SPECIAL CONCERN

SOURCE: OHIO DEPARTMENT NATURAL RESOURCES, OHIO NATURAL HERITAGE DATA SERVICES.

15 miles south of the Ohio Edison Niles site, contains remnant original forests of Mahoning County. Important tree species include cucumber magnolia, wild black cherry, black gum, and several species of oaks and ashes.

- Eagle Creek Nature Preserve. This area is approximately 24 miles northwest of the Ohio Edison Niles site. The varied terrain of this preserve accounts for a wide spectrum of communities supporting a diversity of flora and fauna typical of northeastern Ohio.

3.5 SOCIOECONOMIC RESOURCES

In 1980, the population of Trumbull County was 241,863 and the City of Niles was 23,088 (Bureau of Census, 1980). County population for 1990 is projected at 259,711 and the city population at 24,413; year 2000 projections are 286,938 for the county and 26,685 for the city. The Trumbull County April 1989 civilian labor force was estimated at 104,800 (U.S. Department of Labor, 1989). The county unemployment rate as of April 1989 was 6.6 percent; 6,900 people were unemployed at that time. Over 40 percent of county employment is in the manufacturing sector. Service and retail trades account for 34 percent of employment. Industrial activities include steel manufacturing, coking operations, metal fabricating, and product manufacturing.

3.6 AESTHETIC/CULTURAL RESOURCES

3.6.1 Archaeological/Historical Resources

Niles is a city steeped in history and tradition. Numerous historic sites and landmarks, primarily buildings, are located throughout the city and county. Many sites have been placed on the National Register of Historic Places and attract a significant number of visitors. Niles boasts the birthplace of the 25th president of the United States, William McKinley. Built in his honor, the McKinley Memorial houses a library, museum, and an auditorium. Also listed on the National Register is the Ward-Thomas House, home of an early industrial leader in Niles. These historic sites are located a few miles from the Niles site.

To assess the potential for existing cultural resources at the site, an extensive literature review was conducted of available studies at the Ohio Historic Preservation Offices (Appendix C). The literature review revealed that the project area has not been subjected to any documented professional or amateur field surveys concerning prehistoric, historic or architectural cultural resources. Consequently, no prehistoric or historic archaeological sites nor structures have been reported to occur within the project area. Based on the results of the literature review and the nature of the proposed WSA-SNOX demonstration project within an historically disturbed area, the potential of encountering an undisturbed prehistoric and/or historic archaeological sites or structures appears low. The proposed project area is situated in a tract for which the primary historic land use practice appears to have been agricultural until the construction of the power plant. Although the floodplain landform on which the proposed project area is situated is of similar elevation to others which contain prehistoric sites, it is not in close proximity to a tributary drainage confluence of the Mahoning River, the second conditional factor in prehistoric site locations of the region. The construction of the power plant and the ash ponds already has disturbed the total project area. The proposed project utilizes existing facilities with minimal ground disturbance. Therefore, even though a possibility for an archaeological site within the proposed project area exists, the potential for recovery of significant cultural information is low (Archaeological Services Consultants, Inc., 1989).

3.6.2 Native American Resources

According to the Public Information Division of the National Bureau of Indian Affairs, there are no federally recognized Native American tribes in Ohio; therefore, there are no current tribal practices in the project area.

3.6.3 Aesthetic Character

The Ohio Edison Niles site is not directly visible from State Route 46, a major local arterial, and is somewhat buffered from the river by dense riparian vegetation. The most visually prominent feature of the site is the 393-foot-tall emissions stack. Other visually imposing industrial and commercial facilities located near the site include the Niles wastewater treatment plant and several large industrial plants.

Noise generated by the Ohio Edison Niles site is associated with cyclone boilers, coal handling, and mobile vehicles and equipment. Outdoor ambient noise levels on the 130-acre site are typical of an operating utility facility; however, they do not approach nuisance proportions. There is no record of public complaints regarding noise from the plant.

The site is accessible only by McKees Lane, which leads into State Route 46, to the west. The nearest residential area is approximately one-half mile southeast of the power plant site.

3.6.4 Recreation

No state parks or recreational areas are adjacent to the Ohio Edison Niles site. The plant is located along the lower Mahoning River, which is occasionally used for fishing; however, the state recently released a health advisory warning against fishing and swimming in this portion of the river (see Subsection 3.4.1). Several state parks are located within 25 miles of the site: (1) Mosquito Creek State Park, approximately 10 miles north of the site; (2) Mosquito State Park, approximately 15 miles southwest of the site; and (3) West Branch State Park, approximately 18 miles west of the site. The Grand River State Game Reserve is approximately 15 miles northwest of the site and Mosquito Creek Wildlife Area is approximately 15 miles north of the site. Several municipal parks and recreational facilities are located a few miles north of the site in Niles, including Waddell, Stevens, Kennedy, Hetz, and Murphy parks, and the Stein property.

3.7 ENERGY AND MATERIALS RESOURCES

3.7.1 Coal

At full capacity, the plant utilizes 97.4 tons of coal per hour of operation. In 1988, Unit No. 2 consumed approximately 288,500 tons of coal operating at a 67-percent capacity level. Total plant coal consumption for 1988 was 580,130 tons.

The Ohio Edison Niles power plant uses bituminous coal from two separate sources: Ohio and western Pennsylvania. Approximately 60 percent of the coal is from Ohio and 40 percent is from western Pennsylvania. A portion of the coal is washed before use. The coal burned at the Ohio Edison Niles plant has the following characteristics:

Parameter	Average coal composition (as burned)
Moisture (%)	7.51
Ash (%)	11.98
Sulfur (%)	3.24
Btu Content (Btu/lb)	11,735

The coal storage area contains two distinct piles. A large permanent coal pile is kept in reserve for such incidents as coal miner or trucker strikes; a small working pile supplies coal to the boilers. The plant receives approximately 100 truck loads of coal per day. The trucks unload at the working coal pile, which is regularly replenished. Typically, 100,000 tons of coal are stored on-site; however, the maximum coal storage capacity is 190,000 tons.

3.7.2 Water

Water is diverted from the Mahoning River to the Ohio Edison Niles plant for process needs. In 1988, the water quantity diverted to the facility averaged 140 mgd. The City of Niles supplies a small amount of water (i.e., approximately 0.2 mgd) to the plant for sanitary uses. Figure 3-5 presents water usages for existing plant operations, assuming estimated average flows for each process use.

3.7.3 Power

Internal power needs are being provided by power generated during plant operation.

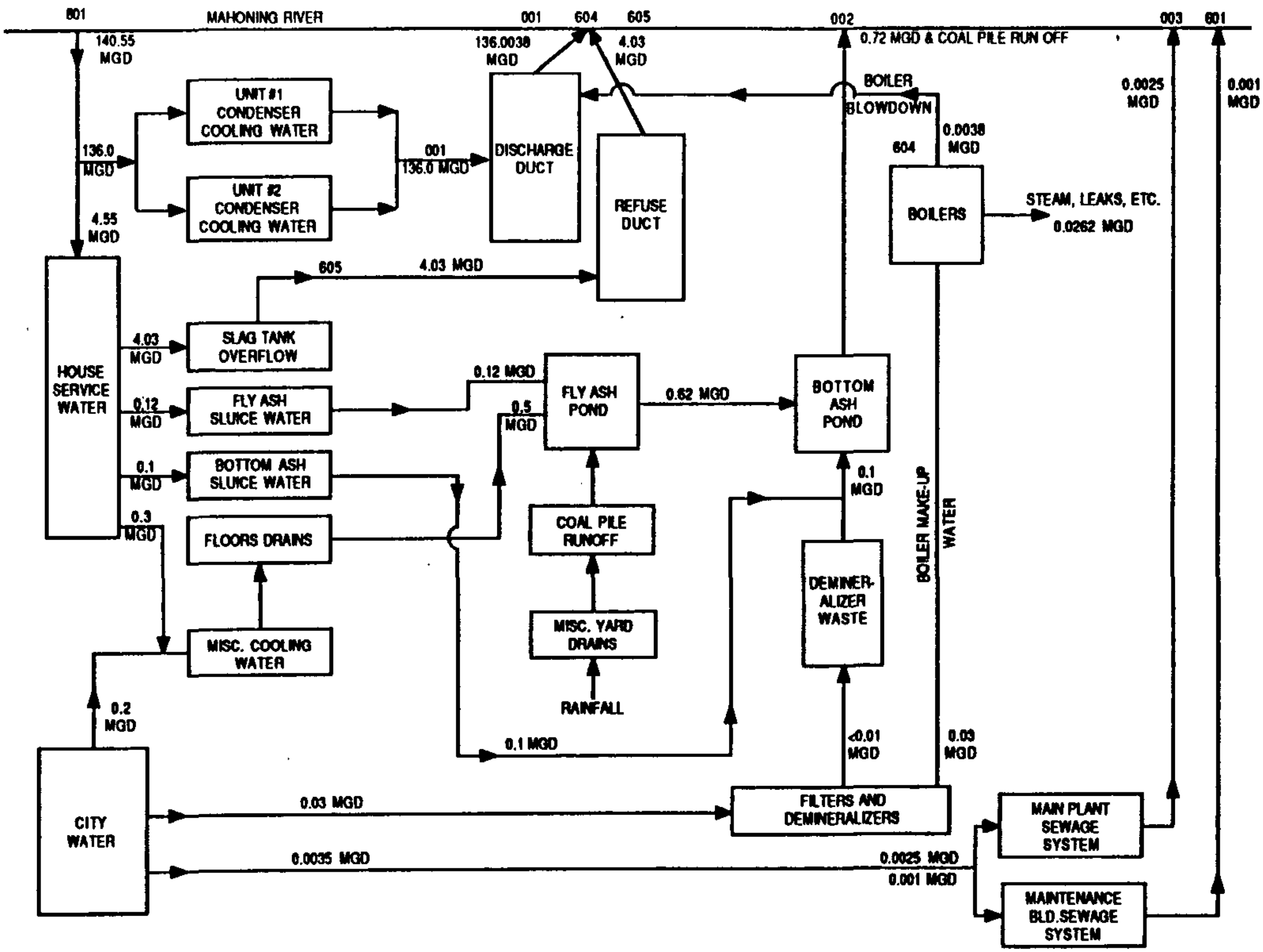

FIGURE 3-5
EXISTING WATER USE DIAGRAM
ESTIMATED AVERAGE FLOW CONDITIONS
OHIO EDISON NILES STATION
NILES, OHIO

C-E Environmental, Inc.

5890-00

4.0 CONSEQUENCES OF THE PROJECT

Project impacts are summarized in Subsection 1.2. The WSA-SNOX project offers a substantial improvement in emissions control with minimal environmental effects, particularly when compared with conventional wet-scrubbing technologies. The primary impact associated with the project will be a significant reduction in sulfur dioxide and nitrogen oxide emissions resulting from the WSA-SNOX treatment of Unit 2 flue gas.

4.1 ATMOSPHERIC IMPACTS

This section presents a comprehensive analysis of anticipated environmental impacts of the demonstration project.

4.1.1 Operations Phase

4.1.1.1 Conventional Power Plant Pollutants. The WSA-SNOX demonstration project will utilize existing coal-receving facilities and plant power, natural gas fuel, and a small amount of river water for cooling. Unit No. 2 is a pre-NSPS coal-fired utility firing eastern high-sulfur coal from Ohio and Pennsylvania.

The current and projected power capacity of the Ohio Edison Niles plant is 108 net MW for Units Nos. 1 and 2, and 30 net MW for the combustion turbine (which is used for peaking purposes). In 1988, the capacity factor was approximately 68 percent for the two coal-fired units (i.e., 216-MW) and only 0.06 percent for the 30-MW combustion turbine. The WSA-NOX technology is not expected to affect existing power plant availability.

Table 4-1 shows the pollutant emissions from the Ohio Edison Niles plant for its current configuration and during the demonstration tests. Estimated short-term emissions assume the Ohio Edison Niles plant is operating at maximum potential rate. Estimated annual average emission rates assume a 70-percent capacity factor for the Ohio Edison Niles plant. As shown in Table 4-1, the emissions of sulfur dioxide, nitrogen oxides, and particulates will be reduced during the demonstration period.

The air quality impacts resulting from operation of the Ohio Edison Niles plant for its current configuration and during the demonstration period were estimated using air quality models approved by the U.S. Environmental Protection Agency (USEPA). The basic ISC model offers two modeling schemes, one designed for short-term air quality assessments (ISCST) that was used to estimate 3- and 24-hour average concentrations and the other for long-term assessments (ISCLT) that was used to estimate annual average concentrations.

The ISC model is a complex model that has been developed and widely used to simulate emissions and diffusion phenomena that can be expected at industrial complexes. Special features of the ISC model include the following:

TABLE 4-1
ESTIMATED POLLUTANT EMISSIONS
FROM EXISTING PLANT AND DEMONSTRATION PROGRAM

ENVIRONMENTAL INFORMATION VOLUME
WSA-SNOX DEMONSTRATION PROJECT

	POLLUTANT EMISSION RATE (lb/hr)					
	EXISTING FACILITY			DURING DEMONSTRATION		
POLLUTANT/PERIOD	UNIT NO. 1	UNIT NO. 2	TOTAL	UNIT NO. 1	UNIT NO. 2	TOTAL
Sulfur Dioxide						
Short-term	7,955.0	7,955.0	15,910.0	7,955.0	5,565.0	13,520.0
Annual average	5,568.5	5,568.5	11,137.0	5,568.5	3,895.5	9,464.0
Nitrogen Dioxide						
Short-term	1,314.0	1,314.0	2,628.0	1,314.0	943.0	2,257.0
Annual average	919.8	919.8	1,839.6	919.8	660.1	1,579.9
Total Suspended Particulates						
Short-term	25.0	25.0	50.0	25.0	17.0	42.0
Annual average	17.5	17.5	35.0	17.5	11.9	29.4

NOTES:

[1] Estimated short-term emission rates assume the Ohio Edison Niles power plant is operating at full load.

[2] Estimated annual average emission rates assume a 70-percent capacity factor for the Ohio Edison Niles power plant.

- building aerodynamics wake effects
- stacktip downwash
- plume rise as a function of downwind distance
- time-dependent exponential decay of pollutants
- elevated terrain

One of the criteria considered in selecting the appropriate air quality model is the evaluation of the dispersion environment. The determination of whether an urban or rural model is more appropriate for the Ohio Edison Niles plant was based on an EPA-recommended procedure that characterizes an area by prevalent land use. In the scheme, areas comprising industrial, commercial and compact residential land use are designed urban. If more than 50 percent of an area circumscribed by a three kilometer (km) radius circle about the source is classified as urban, dispersion coefficients appropriate to an urban environment should be used in the air quality modeling assessment. Based on a review of the land use areas shown on the U.S.G.S. 15 minute quadrangle for Ohio Edison Niles power plant area, less than 50 percent of the area within a three kilometer radius of the Ohio Edison Niles plant can be classified as urban. Thus, the dispersion environment in the vicinity of the plant was classified as rural and the Pasquill-Gifford rural dispersion coefficients were used in the air quality modeling analysis.

Good Engineering Practice (GEP) is defined with respect to stack height as the height necessary to insure that emissions from the stack do not result in excessive concentrations of the source as a result of atmospheric downwash, eddys, and wakes that may be created by the source itself, nearby structures, or nearby terrain obstacles. The GEP definition is based on the observed phenomena of disturbed atmospheric flow in the immediate vicinity of a structure. Based on building and stack height information provided for the Ohio Edison Niles plant, emissions from the 393 ft. stacks will not be subject to the effects of plant structures on pollutant dispersion. Therefore, the ISC model was applied in a non-downwash mode so that an analysis of building downwash effects on ground-level pollutant concentrations was not conducted in this assessment.

Other technical model options available in the ISC models and employed in the air quality assessment are listed in Table 4-2.

The ISCST model uses the standard Gaussian modeling assumptions with Pasquill-Gifford (P-G) dispersion parameters. The ISCST model is a sequential air quality model that calculates ambient 1-hour concentrations at specified locations (receptors) for hourly estimates of wind direction, wind speed, ambient air temperature, P-G stability category, mixing height, wind profile exponent, and vertical potential temperature gradient. An air quality modeling analysis was conducted with the ISCST model using five years of hourly meteorological data to identify the location and magnitude of the maximum concentrations due to pollutant emissions from the Ohio Edison Niles plant.

As provided in Table 4-1 for the existing facility and during the demonstration, the estimated maximum short-term emissions used in the ISCST model were based on the assumption that the Ohio Edison Niles power plant is operating at maximum potential capacity and maximum sulfur content.

TABLE 4-2
ISC MODEL OPTIONS SELECTED FOR AIR QUALITY ANALYSIS OF THE OHIO EDISON NILES POWER PLANT

ENVIRONMENTAL INFORMATION VOLUME
WSA-SNOX DEMONSTRATION PROJECT

OPTION	DESCRIPTION
Dispersion Parameters	Pasquill-Gifford
Dispersion Environment	Rural
Plume Rise	Briggs (Final plume rise)
Buoyancy Induced Dispersion	Used
Stack Tip Downwash	Used
Anemometer Height	10.0 meters
Pollutant Decay with Time	Not used
Wake Effects	Not used
Terrain Treatment	Plane displacement (Up to stack height)

Hourly meteorological data were derived from surface observations recorded at Youngstown Municipal Airport (OH) for the five year period (1983-1987) and concurrent upper air data from Pittsburgh (PA).

A receptor network was developed using a cartesian coordinate system. Receptors were located at one kilometer (km) intervals on a 14-by-14 km grid centered on the Ohio Edison Niles power plant. After the initial air quality assessment with the ISCST model, a refined grid of 0.5-km spacing was added around the point of maximum impact for the Ohio Edison Niles power plant. Terrain elevations selected for the receptor grid were based on the highest contour between the receptor and half the distance to any neighboring receptor on the ISC receptor grid.

The ISCLT is a sector-averaged model that uses statistical wind summaries to calculate annual ground-level concentrations. Principal meteorological inputs to the ISCLT program include annual Stability Array (STAR) summaries that include the joint frequency of occurrence of wind speed and wind direction categories, classified according to the Pasquill stability categories. STAR summaries for five years (1983-1987) for the meteorological data collected at the Youngstown Municipal Airport were prepared in a form suitable for use in the ISCLT model.

As provided in Table 4-1 for the existing facility and during the demonstration, the estimated annual average emission rates assumed that the Ohio Edison Niles power plant operates at a 70-percent capacity factor. The same receptor network and terrain elevations used in the ISCST model were used in the ISCLT model.

Sulfur Dioxide Impact Analysis

Table 4-3 presents the stack parameters used in the air quality assessment of sulfur dioxide emissions (SO_2) emissions from the Ohio Edison Niles power plant for the existing and demonstration test conditions. The stack parameters representing existing conditions and conditions during the demonstration tests are almost identical.

Maximum ambient 3-hour average concentrations due to emissions from the Ohio Edison Niles power plant were estimated using the ISCST model with the hourly meteorological data collected in Youngstown (OH) from 1983 through 1987 and the stack parameters given in Table 4-3. Short-term emission rates of sulfur dioxide was assumed to be 15,910 pounds per hour (lb/hr) for the existing facility and approximately 13,520 lb/hour during the demonstration tests.

The maximum 3-hour average sulfur dioxide (SO_2) concentration due to emissions from the existing facility was calculated to be 669 micrograms per cubic meter ($\mu g/m^3$). As shown in Table 4-3, the maximum 3-hour average SO_2 concentration was calculated to occur based on 1986 meteorological data at a location approximately 12.5 km to the northeast of the Ohio Edison Niles power plant. During demonstration tests, the ISCST model calculated the maximum 3-hour average SO_2 concentration to be 574 $\mu g/m^3$ for the same time period and location. Based on the five years of meteorological data (1983-1987), the ISCST results indicate that the maximum 3-hour average SO_2 concentration would decrease by approximately 95 $\mu g/m^3$ (from 669 $\mu g/m^3$ to 574 $\mu g/m^3$) during the demonstration tests.

TABLE 4-3
AIR QUALITY MODELING ANALYSIS
SULFUR DIOXIDE MAXIMUM 3-HOUR AVERAGE CONCENTRATIONS

ENVIRONMENTAL INFORMATION VOLUME
WSA-SNOX DEMONSTRATION PROJECT

Plant	Ohio Edison - Niles	
Model Applied	ISCLT	
Pollutant Modeled	Sulfur Dioxide (3-Hour Average)	
Stack Parameters	Before Demonstration	During Demonstration
X Coordinate (UTM) - km	521.21	521.21
Y Coordinate (UTM) - km	4,557.09	4,557.09
Stack Height - feet	393.0	393.0
Base Elevation - feet	870.0	870.0
Stack Temperature - °F	280.0	275.0
Stack Diameter - feet	15.6	15.6
Exit Velocity - feet/sec	65.2	65.0
Annual Average Sulfur Dioxide Emission Rate - lb/hr	15,910.0	13,520.0
Meteorology Data:		
Hourly Surface Data	Youngstown, Ohio (1983-1987) Station No. 14852	
Upper Air	Pittsburg, PA (1983-1987) Station No. 94823	
Air Quality Modeling Results		
Maximum 3-Hour Average Sulfur Dioxide Concentration - μg/m³	669.3	574.5
Meteorological Year	1986	1986
Day	296	296
Period	2	2
Location of Maximum Concentration		
Distance from Stack - km	12.5	12.5
Direction from Stack - °	44.6	44.6
Elevation - ft	1200.	1200.
Change in 3-Hour Average Sulfur Dioxide Concentration - μg/m³	--	94.8

7.89.68
0002.0.0

The maximum 3-hour average sulfur dioxide impact due to emissions from the Ohio Edison Niles power plant during both periods are less than the National Ambient Air Quality Standard (NAAQS) for sulfur dioxide (1,300 $\mu g/m^3$). However, no contribution due to other background sources have been included in this analysis.

Based on the short-term emission rates of sulfur dioxide provided in Table 4-1, the maximum 24-hour SO_2 concentration due to emissions from the existing facility was calculated to be 214 $\mu g/m^3$ at a location approximately 12.5 km from the Ohio Edison Niles facility. As given in Table 4-4 for the demonstration test period, the ISCST results indicate that the maximum 24-hour SO_2 concentration would decrease approximately 30 $\mu g/m^3$ (from 214 $\mu g/m^3$ to 184 $\mu g/m^3$).

The maximum 24-hour average sulfur dioxide impact due to emissions from the Ohio Edison Niles power plant during both periods are less than the NAAQS for sulfur dioxide of 365 $\mu g/m^3$. However, no contribution due to other background sources have been included in this analysis.

The maximum annual average sulfur dioxide (SO_2) concentration due to emissions from the Ohio Edison Niles power plant was calculated to be approximately 14 $\mu g/m^3$ by the ISCLT model based on the 1985 Youngstown meteorological (STAR) data at a distance of approximately 9.2 kilometers from the Ohio Edison Niles plant as summarized in Table 4-5. With the reduction of SO_2 emissions during the demonstration tests, the annual average SO_2 concentration due to emissions

TABLE 4-4
AIR QUALITY MODELING ANALYSIS
SULFUR DIOXIDE MAXIMUM 24-HOUR AVERAGE CONCENTRATIONS

ENVIRONMENTAL INFORMATION VOLUME
WSA-SNOX DEMONSTRATION PROJECT

Plant	Ohio Edison - Niles	
Model Applied	ISCST	
Pollutant Modeled	Sulfur Dioxide (24-hour Average)	
Stack Parameters	Before Demonstration	During Demonstration
X Coordinate (UTM) - km	521.21	521.21
Y Coordinate (UTM) - km	4,557.09	4,557.09
Stack Height - feet	393.0	393.0
Base Elevation - feet	870.0	870.0
Stack Temperature - °F	280.0	275.0
Stack Diameter - feet	15.6	15.6
Exit Velocity - feet/sec	65.2	65.0
Annual Average Sulfur Dioxide Emission Rate - lb/hr	15,910.0	13,520.0
Meteorological Data:		
Hourly Surface Data	Youngstown, OH (1983-1987) Station No. 14852	
Upper Air	Pittsburgh, PA (1983-1987) Station No. 94823	
Air Quality Modeling Results:		
Maximum 24-hour Average Sulfur Dixoide Concentration - ug/m^3	214.0	183.8
Meteorological Year	1986	1986
Day	295	295
Period	1	1
Location of Maximum Concentration		
Distance from Stack - km	12.5	12.5
Direction from Stack - °	44.6	44.6
Elevation - feet	1200	1200
Change in 3-hour Average Sulfur Dioxide Concentration - ug/m^3	--	30.2

7.89.68
0003.0.0

from the Ohio Edison Niles plant will be reduced to 12 $\mu g/m^3$ at the same location. The ISCLT model results indicate that during the demonstration period, the annual average sulfur dioxide concentration will be reduced by 2 $\mu g/m^3$.

Nitrogen Oxides Impact Analysis

The annual average sulfur dioxide impact due to emissions from the Ohio Edison Niles power plant during both periods are less than the National Ambient Air Quality Standard (NAAQS) for sulfur dioxide of 80 $\mu g/m^3$. This analysis did not model any other sources of sulfur dioxide or include ambient monitoring data to represent background SO_2 concentrations.

Table 4-6 presents the stack parameters used in the air quality assessment of nitrogen oxide emissions from the Ohio Edison Niles power plant for existing and demonstration operating conditions. With the demonstration project proposing to use the existing stack, the stack parameters representing existing conditions and conditions during the demonstration tests are almost identical.

As shown in Table 4-1, the annual average emission rates of nitrogen oxides were calculated to be 1,840 pounds per hour (lb/hr) for the existing Ohio Edison Niles facility and approximately 1,580 lb/hr during the demonstration period. The estimated annual average nitrogen oxides emission rates assumed a 70 percent capacity factor for the Ohio Edison Niles power plant. For this analysis, all of the nitrogen oxide (NO_x) emissions were assumed to be in the form of nitrogen dioxide (NO_2).

TABLE 4-5
AIR QUALITY MODELING ANALYSIS
SULFUR DIOXIDE ANNUAL AVERAGE CONCENTRATIONS

ENVIRONMENTAL INFORMATION VOLUME
WSA-SNOX DEMONSTRATION PROJECT

Plant	Ohio Edison - Niles	
Model Applied	ISCLT	
Pollutant Modeled	Sulfur Dioxide (Annual Average)	
Stack Parameters	Before Demonstration	During Demonstration
X Coordinate (UTM) - km	521.21	521.21
Y Coordinate (UTM) - km	4,557.09	4,557.09
Stack Height - feet	393.0	393.0
Base Elevation - feet	870.0	870.0
Stack Temperature - °F	280.0	275.0
Stack Diameter - feet	15.6	15.6
Exit Velocity - feet/sec	45.6	45.6
Annual Average Sulfur Dioxide Emission Rate - lb/hr	11,137.0	9,464.0
Meteorology		
Hourly Surface Data	Youngstown, Ohio (1983-1987) Station No. 14852	
Upper Air	Pittsburg, PA (1983-1987) Station No. 94823	
Air Quality Modeling Results		
Maximum Annual Average Sulfur Dioxide Concentration - μg/m^3	13.5	11.6
Meteorological Year	1985	1985
Location of Maximum Concentration		
Distance from Stack - km	9.2	9.2
Direction from Stack - °	57.8	57.8
Elevation - ft	1180	1180
Change in Maximum Annual Sulfur Dioxide Concentration - μg/m^3	--	1.9

TABLE 4-6
AIR QUALITY MODELING ANALYSIS
NITROGEN OXIDES ANNUAL AVERAGE CONCENTRATIONS

ENVIRONMENTAL INFORMATION VOLUME
WSA-SNOX DEMONSTRATION PROJECT

Plant	Ohio Edison - Niles	
Model Applied	ISCLT	
Pollutant Modeled	Nitrogen Oxides (Annual Average)	
Stack Parameters	Before Demonstration	During Demonstration
X Coordinate (UTM) - km	521.21	521.21
Y Coordinate (UTM) - km	4,557.09	4,557.09
Stack Height - feet	393.0	393.0
Base Elevation - feet	870.0	870.0
Stack Temperature - °F	280.0	275.0
Stack Diameter - feet	15.6	15.6
Exit Velocity - feet/sec	45.6	45.5
Annual Average Nitrogen Oxides Emission Rate - lb/hr	1,839.6	1,579.9
Meteorological Data:		
Hourly Surface Data	Youngstown, OH (1983-1987) Station No. 14852	
Upper Air	Pittsburgh, PA (1983-1987) Station No. 94823	
Air Quality Modeling Results:		
Maximum Annual Average Nitrogen Oxides Concentration - ug/m^3	2.2	1.9
Meteorological Year	1985	1985
Location of Maximum Concentration		
Distance from Stack - km	9.2	9.2
Direction from Stack - °	57.8	57.8
Elevation - feet	1180	1180
Change in Maximum Average Nitrogen Oxides Concentration - ug/m^3	--	0.3

The maximum annual average nitrogen dioxide (NO_2) concentration due to emissions from the existing Ohio Edison Niles plant configuration was calculated by the ISCLT model to be 2.2 $\mu g/m^3$ (1985) at a distance of approximately 9.2 kilometers northeast of the Ohio Edison Niles power plant. With the reduction of NO_x (analyzed as NO_2) emissions during the demonstration program, the maximum annual average NO_2 concentration will be reduced to 1.9 $\mu g/m^3$ at approximately the same location. As summarized in Table 4-6, the reduction of NO_x emissions during the demonstration will result in a decrease in maximum annual NO_2 concentration of approximately 0.3 $\mu g/m^3$.

The annual average nitrogen dioxide impacts due to emissions from the Ohio Edison Niles power plant during both periods are less than the National Ambient Air Quality Standard (NAAQS) for nitrogen dioxide (100 $\mu g/m^3$). However, no contribution due to other background sources have been included in this analysis.

Particulate Impact Analysis

The maximum short-term particulate emission rate (assumed all particulate matter to be 10 micrometers or less, i.e., PM_{10}) from the existing Ohio Edison Niles power plant was calculated to be 50 lb/hr. As shown in Table 4-1, the maximum short-term particulate emission rate would be reduced to approximately 42 lb/hr during the demonstration tests. The annual average particulate emission rate from the existing Ohio Edison Niles facility was calculated to be 35 lb/hr, with emissions decreasing to approximately 29 lb/hr during the demonstration tests.

The estimated annual average emission rates assumed a 70-percent capacity factor for the Ohio Edison Niles power plant.

Table 4-7 presents the stack parameters used in the air quality assessment with the ISCST model. The stack parameters representing existing conditions and conditions during the demonstration tests are almost identical.

Maximum ambient 24-hour average concentrations due to emissions from the Ohio Edison Niles power plant were estimated using the ISCST model with the hourly meteorological data collected in Youngstown (OH) from 1983 through 1987. The maximum 24-hour average particulate (PM_{10}) concentration due to emissions from the existing facility was calculated to be 1.5 micrograms per cubic meter ($\mu g/m^3$). As shown in Table 4-7, the maximum 24-hour average PM_{10} concentration was calculated to occur in 1986 at a location approximately 12.5 km northeast of the Ohio Edison Niles power plant. During demonstration tests, the ISCST model calculated the maximum 24-hour average PM_{10} concentration to be 1.3 $\mu g/m^3$ for the same time period and location. Based on the five years of meteorological data (1983-1987), the ISCST results indicate that the maximum 24-hour average PM_{10} concentration would decrease by approximately 0.1 $\mu g/m^3$ during the demonstration period.

The maximum 24-hour average PM_{10} impact due to emissions from the Ohio Edison Niles power plant during both periods are less than the NAAQS for PM_{10} of 150 $\mu g/m^3$. However, no contribution due to other background sources have been included in this analysis.

TABLE 4-7
AIR QUALITY MODELING ANALYSIS
TOTAL SUSPENDED PARTICULATES MAXIMUM 24-HOUR AVERAGE CONCENTRATIONS

ENVIRONMENTAL INFORMATION VOLUME
WSA-SNOX DEMONSTRATION PROGRAM

Plant	Ohio Edison - Niles	
Model Applied	ISCST	
Pollutant Modeled	Total Suspended Particulates (24-hour Average)	
Stack Parameters	Before Demonstration	During Demonstration
X Coordinate (UTM) - km	521.21	521.21
Y Coordinate (UTM) - km	4,557.09	4,557.09
Stack Height - feet	393.0	393.0
Base Elevation - feet	870.0	870.0
Stack Temperature - °F	280.0	275.0
Stack Diameter - feet	15.6	15.6
Exit Velocity - feet/sec	65.2	65.0
Annual Average Sulfur Dioxide Emission Rate - lb/hr	50.0	42.0
Meteorological Data:		
Hourly Surface Data	Youngstown, OH (1983-1987) Station No. 14852	
Upper Air	Pittsburgh, PA (1983-1987) Station No. 94823	
Air Quality Modeling Results:		
Maximum 24-hour Average TSP Concentration - ug/m^3	1.5	1.3
Meteorological Year	1986	1986
Day		
Period		
Location of Maximum Concentration		
Distance from Stack - km	12.5	12.5
Direction from Stack - °	44.6	44.6
Elevation - feet	1200	1200
Change in 24-hour Average TSP Concentration - ug/m^3	--	0.1

7.89.68
0006.0.0

Table 4-8 presents the stack parameters used in the air quality assessment with the ISCLT model using five years of meteorological data from Youngstown, OH (1983-1987). The stack parameters representing existing conditions and conditions during the demonstration tests are almost identical.

The maximum annual average particulate (PM_{10}) concentration due to emissions from the existing Ohio Edison Niles facility was calculated by the ISCLT model to be 0.04 $\mu g/m^3$ (1985), which is insignificant when compared to the annual average PM_{10} NAAQS of 50 $\mu g/m^3$. The ISCLT model calculated that the annual average PM_{10} concentration during the demonstration period would also be approximately 0.04 $\mu g/m^3$.

4.1.1.2 Fugitive Emissions. It is not anticipated that fugitive particulate emissions will be generated during the demonstration period. Demonstration-related equipment will not involve secondary particulate sources, with the possible exception of the fabric filters. The particulate control devices will be well-maintained and care will be taken to avoid fugitive emissions.

4.1.1.3 Noise. The booster and cooling air fan will provide additional sources of noise during the demonstration program. Noise from demonstration-related equipment, however, is not expected to noticeably increase existing ambient noise levels on- or off-site. A potential vendor for the additional fans has estimated uninsulated fan noise as follows:

I.D. fan:	90-100 dBA at 3 ft radius
Ammonia air blower:	85-95 dBA at 3 ft radius

TABLE 4-8
AIR QUALITY MODELING ANALYSIS
TOTAL SUSPENDED PARTICULATES ANNUAL AVERAGE CONCENTRATIONS

ENVIRONMENTAL INFORMATION VOLUME
WSA-SNOX DEMONSTRATION PROJECT

Plant	Ohio Edison - Niles	
Model Applied	ISCLT	
Pollutant Modeled	Total Suspended Particulates (Annual Average)	
Stack Parameters	Before Demonstration	During Demonstration
X Coordinate (UTM) - km	521.21	521.21
Y Coordinate (UTM) - km	4,557.09	4,557.09
Stack Height - feet	393.0	393.0
Base Elevation - feet	870.0	870.0
Stack Temperature - °F	280.0	275.0
Stack Diameter - feet	15.6	15.6
Exit Velocity - feet/sec	45.6	45.5
Annual Average Nitrogen Oxides Emission Rate - lb/hr	35.0	29.4
Meteorological Data:		
Hourly Surface Data	Youngstown, OH (1983-1987) Station No. 14852	
Upper Air	Pittsburgh, PA (1983-1987)	
Air Quality Modeling Results:		
Maximum Annual Average TSP Concentration - ug/m^3	0.04	0.04
Meteorological Year	1985	1985
Location of Maximum Concentration		
Distance from Stack - km	9.2	9.2
Direction from Stack - °	57.8	57.8
Elevation - feet	1180	1180
Change in Maximum Annual TSP Concentration - ug/m^3	--	< 0.01

Although no measurements of existing ambient sound pressure levels are readily available for the site, the general principles of sound combination and attenuation by buildings and simple distance dictate that the additional fans will be insignificant new sources of noise. For example, the axiom of sound level combination shows that, to the nearest decibel, a difference in sound levels of 0-1 dB will a 3 dB to the higher level, a difference of 2-4 dB adds 2 dB, a 6-8 dB difference adds 1 dB, and essentially no increase to the higher source occurs once the difference is 9 dB or greater. The axiom of far-field attenuation (which does not account for the significant additional attenuation of buildings and vegetation) indicates a loss of approximately 6 dBA per doubling of distance from a non-linear source (i.e., attenuated level = source level - 20 Log_{10} r + 2.3, where r is radius in feet.

Outdoor ambient noise levels are thus not expected to increase above existing operating noise levels, and indoor noise levels will meet federal occupational safety and health standards.

<u>4.1.1.4 Potential Plume Impacts Associated With Scrubbing Systems</u>. The demonstration equipment will involve sulfuric acid as a by-product of the sulfur dioxide removed. The plume from the WSA-SNOX unit will be low in moisture and ducted into the flue-gas stack for release. There is no other plume to interact with the exhaust from the flue gas stack. The scrubbing system itself will emit very low concentration of sulfur dioxide, nitrogen oxides, and particulates. These emissions will result in decreased off-site impacts.

4.1.2 Construction Phase

The potential for air emission impacts during the construction stage will be limited to fugitive emissions from general construction activities. Fugitive emissions from construction activities may result from increased vehicular traffic on internal unpaved roads and cleared areas and general construction activities. Because the acreage involved in the demonstration projection is limited, air quality impacts from fugitive emissions should be slight. Fugitive dust from identifiable construction sources will be minimized by one of the following techniques:

- Unpaved road: spray with water or asphalt cutback; apply gravel subbase or dust palliatives

- Open trucks: provide covers; moisten with water

4.2 LAND IMPACTS

Project facilities will be constructed entirely within the boundaries of the existing Ohio Edison Niles site. A 150-by-120-foot area (approximately 0.4 acres) adjacent to Unit No. 2 will be utilized for the demonstration project. The area is appropriately zoned by Weathersfield Township for the existing and proposed facilities. No additional land will be required by the project. Potential soil loss during construction will be controlled by appropriate erosion and sediment control measures, such as silt fencing and staked hay bales. Flood-prone areas on the Ohio Edison Niles site, along the shore of the Mahoning River, will not be encroached upon by the new facilities. Because the project will utilize existing coal supplies, no additional coal storage area will be required. No modifications to the existing infrastructure (i.e. roads, water supply system) will be needed to support the demonstration project.

The amount of fly ash generated at the plant will increase slightly during project operation because the removal efficiency of the baghouse will be higher than the ESPs. An estimated 7,788 tons of fly ash will be recovered from the baghouse annually; the chemical and physical properties will be identical to fly ash removed from the Ohio Edison Niles ESPs. Fly ash removed from the baghouse will be sluiced to on-site ash ponds through the existing ash-handling system.

4.3 WATER QUALITY IMPACTS

4.3.1 Water Supply

The WSA-SNOX demonstration project will slightly increase the amount of cooling water used at the plant. Under current conditions, the plant utilizes approximately 136 mgd of Mahoning River water for cooling purposes. The project will employ an additional 0.12 mgd of cooling water. This incremental increase in water will be obtained from the Mahoning River through the existing intake structure. The plant's in-house water supply will not be affected by the project. During the summer months, generation at the power plant is sometimes limited by the load management plan during low river flow and high ambient temperature conditions (see Subsection 3.4.1). Presumably, operation of the demonstration project will also be limited during these low flow periods.

No additional coal will be utilized; however, the quantity of fly ash produced at the plant will increase by approximately .1 percent because the removal efficiency of the baghouse will be greater. The plant currently uses 0.12 mgd of sluice water to transport fly ash to the ash pond. The amount of sluice water currently utilized should be sufficient to accommodate the incremental increase in fly ash generated by the project.

4.3.2 Discharges

Once-through condenser cooling water is currently discharged to the Mahoning River through a NPDES-permitted Outfall 001. The cooling water discharge does not receive waste from the generating units except heat and a water-treatment chemical.

The Ohio Edison Niles plant utilizes a load management program to limit thermal input to the Mahoning River (see Subsection 3.4.1). Waste heat rejection is determined daily by using real-time river flow and ambient temperature data. Daily allowable generation is adjusted accordingly to maintain the downriver temperature at levels that will assure the protection and propagation of a balanced warm-water aquatic community. The demonstration project will cause a slight increase in total cooling water discharge at the plant. Project cooling water will be returned to the main plant and discharged to the Mahoning River through existing Outfall 001. The additional cooling water will be subject to the Ohio Edison Niles load management program so that plant cooling water discharge continues to meet thermal limitations outlined in the existing NPDES permit. Boiler blowdown wastewater will not be affected by the demonstration project.

Ash produced at the plant will increase by approximately 1 percent because the removal efficiency of the baghouse will be greater. Because the additional quantity of fly ash is relatively insignificant, ash composition and the associated ash sluice water will remain consistent with that of current operations. The required volume of ash sluice water should be unaffected by the demonstration project.

Stormwater runoff from the demonstration project area will be directed as it is currently. The project will introduce a small area of new impervious surface; therefore, the total volume of stormwater runoff from the site should not significantly increase. No additional coal will be required for the project; therefore, the amount of coal pile runoff should be unchanged. Runoff from project construction activities is expected to be minimal because land surfaces will not be significantly disturbed and the area of impacted land is small. No impacts to regulated wetlands are expected to result from the project (see Subsection 3.3.1).

In summary, the WSA-SNOX project will have little effect on the overall plant water usage and no significant impact on the volume and composition of water discharges.

4.4 ECOLOGICAL IMPACTS

Project construction or operation is not anticipated to disturb any wildlife or plant habitats. The Ohio Edison Niles site and ash pond area have long been occupied for utility use. The site area required for the WSA-SNOX project is only 120-by-150 feet. Based on a review of the Ohio Natural Resources Heritage Inventory, (Ohio Department of Natural Resources, 1989) there are no federal or state-endangered or threatened species or unique or rare ecological habitats at the Ohio Edison Niles site.

Potential project impacts to on- or off-site biota resulting from air emissions, while not considered significant, are judged to be fewer and of less significance than impacts currently generated without emissions controls. The demonstration project will slightly increase the amount of cooling water utilized at the plant. Because Ohio Edison will continue to implement its load management program in accordance with thermal effluent limitations during the project operating period, project cooling water discharges should have no detrimental effect on the Mahoning River Biota (see Subsection 3.4.1). Therefore, minimal ecological impacts are anticipated to result from the WSA-SNOX project.

4.5 SOCIOECONOMIC IMPACTS

Construction of the WSA-SNOX project will have a beneficial effect on the local and regional economy. An estimated 50,000 labor hours will be required for project construction, which will be supplied by the local and regional labor markets (see Subsection 3.5). The project will purchase a portion of construction and operating materials from local and regional suppliers, thereby providing a slight positive effect on the local and regional economy through procurement of labor services and construction and operating materials.

The eight-month construction period will be marked by a slight increase in traffic to and from the site, resulting largely from construction personnel trips and materials deliveries. Currently, the Ohio Edison Niles plant generates approximately 200 coal delivery trips per day and 200 average daily weekday employee trips in and out of the plant. Construction-related trips have been estimated on the basis of estimated number of construction workers and estimated equipment deliveries. Assuming that a maximum of 50 construction workers will be employed during the construction period and conservatively assuming 10 equipment deliveries per day, approximately 100 additional average daily weekday trips (in and out) can be estimated during the WSA-SNOX project construction period. Based on these estimates, truck deliveries at the site are expected to increase by only 5 percent during the construction period. Primary access to the site is via McKees Lane off State Route 46. The average daily traffic count is 2,040 for the intersection of McKees Lane and Route 46, based on 1986 data and 6,120 for the intersection of Youngstown Road and State

Route 46, based on 1983 data (EDATA). Based on the above assumptions, weekday daily trips at this intersection are expected to increase by approximately 5 percent over existing traffic levels during project construction. The high capacity of the adjacent State Route 46 and the proximity to Interstate 80 and other state routes suggest that these additional trips will have a negligible effect on off-site traffic flow patterns or safety. The favorable location of the site, adjacent to a major state route, will minimize short-term roadway impacts that could result from construction traffic.

Ohio Edison plans to utilize existing staff to operate the WSA-SNOX project; therefore, employee trips are not expected to increase during the operation phase. No additional coal deliveries will be required during operation of the project.

he Ohio Edison Niles power plant is located in the heart of a region producing gh-sulfur coal. The region and state should benefit directly from monstration of clean coal-power retrofit technologies that can improve the riously eroded markets for high-sulfur coal.

AESTHETIC AND CULTURAL IMPACTS

WSA-SNOX project will not create a significant negative visual impact. The is currently dominated by existing Ohio Edison Niles facilities (see ction 2.1.1), which are a key factor in calculating the aesthetic baseline

1

has declined and will continue to decline due to production expense and depleting reserves. A second major sulfur source is through recovery as a coproduct from sour natural gas and petroleum-refinery operations. Production rate of sulfur from these sources is fixed by the production rate of the major product. The third significant sulfur source is from nonferrous metal-smelting operations. Production from this latter method is expected to decline as alternative ore-processing methods (leaching) increase. One long-range projection is that 75 percent of production will come from coproduct sources. Without additional domestic sources (e.g., recovery of sulfuric acid from power plants), sulfur imports and/or shortages are projected to increase in the next century.

Sulfuric acid is a major commodity chemical in the U.S. Phosphate fertilizer, petroleum-refining, and industrial chemical industries account for over 82 percent of total sulfuric acid consumption, with each industry representing 66.4, 8.1, and 7.7 percent, respectively. The remainder is used by other industries (e.g., mining, metals, pigments and paints, rubber, plastics, and pulp and paper production). Current market prices for 100-percent pure sulfuric acid range from $68 to $72 per ton in the southeast to $85 to $90 per ton in the west.

In the area within a 200 mile radius of the plant site, the use of high purity acid is approximately 240,000 to 260,000 tons/year. Currently the majority of the acid used in the area is imported from Canada and Utah. It is anticipated that the output from the demo unit would account for approximately 5-6% of the acid used locally and would most likely displace the imported acid. Based on actual acid produced in the pilot plant located in Denmark at a utility plant, the produced acid is of an industrial grade quality. Therefore the likelihood of being able to market the acid is very high.

The demonstration unit will include an off-spec storage tank for approximately two days of full load operation. This is equal to a tank sized for 11,000 gal. This acid will be handled in the same manner as the high purity acid and sold to the same contract for distribution. This acid can be utilized by various industries. The amount of the off-spec acid is expected to occur only during initial start-up and after catalyst change. Typically the impurities in the acid would come from traces of grease, oil, catalyst dust or other materials found in the system. This would usually result in coloring of the acid and a slight reduction in the acid concentration.

In summary, a significant market does exist for sulfuric acid produced from the WSA-SNOX project. Long-range projections indicate a shift in overall sulfur production to coproduced sources, such as this project. The incremental capacity of a typical installation is small in relation to the overall market, and therefore, would be expected to cause little disruption in the near term.

4.8 IMPACT SUMMARY

In summary, there are several positive effects associated with the WSA-SNOX project: (1) reductions in sulfuric acid, nitrogen oxides, and particulate matter emissions from Unit No. 2, (2) stimulus to the local economy from construction and operation activities, and (3) production of a marketable concentrated sulfuric acid by-product. Judging from available information, the proposed project presents minimal environmental impacts and will not place a significant burden on available energy and material resources. Other potential impacts are judged as negligible by virtue of the project site context.

4.8.1 Mitigation Measures

4.8.1.1 Air Quality. Because the WSA-SNOX technology reduces emissions from current levels, no further mitigation measures are required for project operations. Fugitive particulate emissions during construction and operation phases of the project will be minimized by use of best management practices, such as wetting roads.

4.8.1.2 Water Quality. During project construction, potential runoff to the Mahoning River will be mitigated by use of conventional erosion and sediment control measures, such as silt fencing and stacked hay bales. During operation of the project, additional cooling water will be discharged to the Mahoning River. To mitigate against potential thermal impacts on the aquatic community, Ohio Edison Niles will continue to implement its load management program, which limits waste heat discharge to the river.

Ohio Edison Niles maintains an Emergency Procedures Manual, an Emergency Contingency Plan for hazardous wastes, and a Spill Prevention, Containment, and Countermeasure Plan for guarding the site against accidental spills or oil releases. C-E, Snamprogetti, and Ohio Edison will review these provisions and make appropriate changes to emergency plans to safely accommodate the WSA-SNOX demonstration project.

4.8.2 Monitoring

During the proposed two-year demonstration program, extensive monitoring will be conducted to evaluate technical and economical efficiency of the WSA-SNOX technology in coal-fired power stations utilizing U.S. high-sulfur coals. Further, the test work will provide baseline data for engineering, manufacturing, constructing and operating full-scale WSA-SNOX plants to be integrated into coal-fired power stations in the U.S.

Comprehensive sulfur oxides, nitrogen oxides, and particulate emissions monitoring will be conducted during project operation. Monitoring will be carried out continuously by automatic multipoint analyzers and will be supplemented by manual sampling and analysis for calibration purposes. A thorough assessment of emission data collected during various load conditions at steady operating conditions will be compared with data from mass balances performed for various locations of the plant.

The demonstration program will include a thorough on-going assessment of steady-state performance compared to design expectations to provide information about the effects of plant maintenance and preferred operating conditions. Plant dynamic response and system control capability will also be thoroughly evaluated. Considerable efforts are planned to evaluate performance of materials and equipment.

Baseline measurements will be taken in areas of interest throughout the plant, and regular nondestructive examinations and detailed mechanical inspections during shutdowns are planned to evaluate behavior of construction materials. A detailed analysis will be performed of failed components and materials to provide an understanding of the cause and mechanism of failure and to prevent recurrences.

The concentration of the sulfuric acid product will be monitored continuously, and manual sampling and analysis will be performed to determine the possible content of trace metals.

Extensive by-product characterization will also be undertaken during project operation. Most the fly ash generated by the project will be identical in composition to fly ash currently collected at the plant. The ash will be transported through the existing ash-handling system to the ash ponds for storage. The demonstration project will also produce a small amount of vanadium-containing fly ash. The Toxicity Characteristic Leaching Procedure and EP Toxicity test will be conducted on representative samples of the vanadium-containing fly ash.

Monitoring ash pond supernatant is not proposed beyond that required by existing permits. The ash ponds have been in use for many years and receive both fly and bottom ash. Because of the commingling of facility and project waste, it would not be possible to identify environmental impact sources. Further, the purpose of the demonstration project is to demonstrate the WSA- SNOX technology, not the design adequacy of the existing ash ponds.

4.9 IMPACTS OF ALTERNATIVES TO THE PROPOSED ACTION

This section addresses three alternatives to the proposed action: no-action, the use of alternative technologies, and the use of alternative sites.

4.9.1 No-Action Alternative

Under this alternative, the WSA-SNOX technology would not be installed at the Ohio Edison Niles station. Consequently, environmental conditions at the site would remain unchanged. In particular, sulfur dioxide and nitrogen oxide emissions would be unchanged from current operating conditions. Benefits gained from reducing emissions by using the WSA-SNOX process would not be realized.

4.9.2 Alternative Technologies

As noted in Subsection 2.2.2, the ICCT PEIA provides a comparison of alternative conventional and advanced flue-gas desulfurization processes. In the PEIA, environmental characteristics for various proposed ICCT processes are described and evaluated.

Methods of sulfur dioxide or nitrogen oxide control currently available or being tested are difficult to apply to cyclone-fired boilers. Cyclone-fired boilers reject most coal ash from the furnace bottom, and this design produces relatively low fly ash loading in the convective section and ESP. Therefore, they are not readily compatible with sorbent injection techniques for sulfur dioxide control, which would represent almost one order of magnitude increase in solids throughput. Wet-scrubbing sulfur dioxide could be added; however, its high capital cost and large space requirements are generally incompatible with cyclone boilers, which tend to be older units with short remaining lifetimes that have limited available adjoining space.

Conventional wet-scrubbing technologies generate a significant amount of solid waste in comparison to the WSA-SNOX process, which produces minimum waste by-products. Conventional technologies would not generate the commercially marketable sulfuric acid by-product produced during the WSA-SNOX process. During conventional wet scrubbing processes, only sulfur dioxide is removed from the flue gas. The WSA-SNOX technologies, however, offer improved sulfur dioxide removal efficiency and removal of nitrogen oxide and particulate matter. Water consumption in the conventional wet-scrubbing technologies would most likely be greater than the water use expected for the WSA-SNOX project, when compared on an equivalent-throughput basis. Water consumption for a wet flue-gas desulfurization limestone system of similar size to the WSA-SNOX demonstration project would be approximately 33 to 38 gpm, while the WSA-SNOX project would consume no water.

The alternative technologies are environmentally less favorable than the proposed project, while lacking the efficiency and effectiveness benefits of the WSA-SNOX process.

4.9.3 Alternative Sites

Ohio Edison also considered the Burger site in Dilles Bottom, Ohio, suitable for demonstration of the WSA-SNOX technology. The environmental impacts of installing the WSA-SNOX project at the Burger site also appear to be negligible; however, no formal environmental analysis has been completed.

5.0 REGULATORY COMPLIANCE

Section 5.0 describes permit requirements and regulatory programs currently applicable to the Ohio Edison Niles plant and anticipated permit modifications for the demonstration project. As a result of consultation with regulatory agencies and Ohio Edison Niles staff, necessary or potential permit requirements for the project have been identified and summarized in Table 5-1. The tentative permit schedule of the project requires filing applications for these approvals with the appropriate agencies in 1990. Project approvals will be obtained before project construction or operation, as appropriate.

5.1 AIR QUALITY

Air emissions from the Ohio Edison Niles plant are subject to provisions of the federal Clean Air Act and Ohio Air Pollution control Laws. Ohio EPA is authorized to administer provisions of these programs.

Ohio EPA has issued two permits to the Ohio Edison Niles plant to operate an air-contaminant source. Each boiler is identified as a source (i.e., Permits Nos. 02-78-06-0023-B001 and B002 for Boilers Nos. 1 and 2, respectively). The boilers are exhausted into separate flues that share a common stack. Both permits are effective through May 19, 1991. The permits specify testing, monitoring, maintenance, and reporting requirements for each source. Because

TABLE 5-1
REQUIRED AND POTENTIAL REGULATORY APPROVALS
APPLICABLE TO THE WSA-SNOX PROJECT

ENVIRONMENTAL INFORMATION VOLUME
WSA-SNOX DEMONSTRATION PROJECT

APPROVAL	RESPONSIBLE AGENCY	SCOPE
Anticipated		
NEPA documentation	DOE	Assessment of project environmental impacts
Environmental Monitoring Plan	DOE	Compliance and environmental characterization monitoring
PSD review for modification to major source	OEPA (Air Division)	Project air emissions
Building and occupancy permits	Trumbull County Planning Department	Construction/alteration and occupancy of buildings and plumbing, heating, electrical systems
Potential		
Modification of existing emergency contingency plans	Various	Project occupational health and safety; spill prevention containment, and countermeasures

6.89.81T
0005.0.0

the control equipment for Source No. 2 will be modified, an Ohio EPA application must be filed for a permit to operate an air-contaminant source. The application requires information concerning the control equipment and the sulfuric acid storage tank. Emissions are expected to adhere to the existing permit conditions.

An Ohio EPA application for a permit to install the new control system also requires completion. The application requires information concerning anticipated compliance with air quality regulations, construction schedules, costs, and technical specifications of the control equipment.

New source review under the federal or Ohio New Source Performance Standards or Prevention of Significant Deterioration regulations will not be required. The National Emission Standards for Hazardous Air Pollutants also is not applicable. The control equipment modifications are considered minor, and the demonstration project is not anticipated to cause or contribute to a failure to attain NAAQS.

Operational fugitive emissions are not expected to change as a result of the demonstration project; permitting requirements are not applicable. Fugitive emissions during construction are expected to be insignificant; however, appropriate control measures will be followed to minimize emissions.

5.2 SOLID WASTE

Ohio Edison Niles currently operates ash settling ponds near the main facility. Process wastes generated by existing plant operations consist of bottom and fly ash from Units Nos. 1 and 2. Bottom and fly ash is sluiced via separate pipelines to the ash storage area. Bottom ash is held in a 3.5-acre pond and fly ash is stored in two ponds covering 4.4 and 2.8 acres, respectively. The ponds are separated by 18-foot-wide earthen berms. Bottom ash is removed continuously and sold to the Reed Mineral Division of the Harsco Company of Highland, Indiana. Approximately once every eight years, fly ash is removed from the ponds and transported off-site to a landfill in Richmond, Ohio. In 1988, Ohio Edison Niles collected 70,000 tons of ash from the plant, approximately 80 percent of which was bottom ash, and 20 percent was fly ash.

Nontoxic fly and bottom ash are exempt from classification as hazardous waste under federal regulations (40 CFR 261.4) and as solid waste under Ohio regulations (Revised Code Chapter 3734). The bulk of project fly ash will be virtually identical to fly ash currently generated by the plant. However, a small amount of vanadium-containing fly ash will be generated during periodic cleaning of the catalyst beds (see Section 2.1.2.3). USEPA EP Toxicity testing and analysis of physical properties, along with leachate testing, will be conducted on representative samples of the vanadium-containing fly ash. Results of these analyses are anticipated to provide adequate evidence to regulatory authorities and Ohio Edison that the vanadium-containing fly ash is non-toxic and can be safely commingled with conventional fly ash. Notwithstanding the preceding, this vanadium-containing fly ash will be handled separately and not commingled with the conventional fly ash produced at the Niles Plant. According to Ohio EPA policy No. 4.07, the disposal site receiving the commingled waste will be exempt from state solid waste disposal rules.

The DeSOx catalyst VK-38 is currently supplied by Haldor Topsoe in the US to acid producers where sulfur is burned, and the gases are oxidized to SO_3 by the catalyst and then condensed to H_2SO_4. The spent catalyst is reclaimed by companies such as STRATCOR, Hot Springs, Arkansas and UNC Reclamation, Mulberry, Florida. STRATCOR has reclaimed HTAS catalyst in the past and would do so provided that after they have analyzed a sample of the material, they find nothing that cannot be sent to their tailings ponds after the Vanadium has been recovered. STRATCOR has analyzed dedusting material from the pilot plant in Denmark and found that material was acceptable to them for reclaiming and disposal. Should a problem arise with disposing of the VK-38 catalyst, C-E will arrange for disposal at a licensed landfill or hazardous landfill.

The $DENO_x$ catalyst (DN_x) is a new catalyst for which HTAS is preparing a MSDS. This catalyst is also expected to be reclaimable. In the event that disposal is a problem, HTAS will contract to take back this catalyst.

SOURCE: U.S.G.S. QUADRANGLES
GIRARD, OHIO 1962, PHOTOREVISED 1979
WARREN, OHIO 1959, PHOTOREVISED 1984
7.5 MINUTE SERIES

SCALE
0 2000 4000 FEET

FIGURE 5-1
OHIO EDISON NPDES OUTFALL
LOCATIONS ON THE MAHONING RIVER
WSA-SNOX DEMONSTRATION PROJECT
OHIO EDISON NILES STATION
NILES, OHIO

C-E Environmental, Inc.

5890-00

TABLE 5-2
OHIO EDISON NILES STATION OUTFALLS
OHIO EPA NPDES PERMIT 31B00007

ENVIRONMENTAL INFORMATION VOLUME
WSA-SNOX DEMONSTRATION PROJECT

NUMBER	AVERAGE FLOW (million gallons per day)	DISCHARGE ORIGIN
001	136	Condenser cooling water and main building roof drain
002	0.72	Ash pond discharge, originating from fly ash and bottom ash sluice
003	0.0025	Main plant sewage system discharge
004		Maintenance building area storm sewer
005		Maintenance building area storm sewer
006		Northwest yard storm sewer
007		Combined substitution and yard drainage discharge to City of Niles storm ditch
601	0.001	Maintenance building sewage system discharge
604	0.0038	Boiler blowdown
605	4.03	Slag tank overflow and screenhouse roof drain discharge

ADDITIONAL MONITORING POINTS	DESCRIPTION OF LOCATION
801	Cooling water intake
802	Upstream of ash pond discharge point representative of ambient temperature of the Mahoning River
901	Calculated downstream point of plant

TABLE 5-3
NPDES DISCHARGE LIMITS[1]

ENVIRONMENTAL INFORMATION VOLUME
WSA-SNOX DEMONSTRATION PROJECT

			TRC		TSS		OIL/GREASE		BOD_5		FECAL COLIFORM	
OUTFALL	TEMP °F	pH	30-DAY AVERAGE	DAILY MAXIMUM	30-DAY AVERAGE	DAILY MAXIMUM	30-DAY AVERAGE	DAILY MAXIMUM	30-DAY AVERAGE	DAILY MAXIMUM	30-DAY AVERAGE	DAILY MAXIMUM
001	NA	6-9	NA	0.2	NA	NA	NA	NA	NA	NANA	NA	
002	NA	6-9	NA	NA	30	100	15	20	NA	NANA	NA	
003	NA	6-9	2.0	3.0	30	45	NA	NA	30	451000	2000	
004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NANA	NA	
005	NA	NA	NA	NA	NA	NA	NA	NA	NA	NANA	NA	
006	NA	NA	NA	NA	NA	NA	NA	NA	NA	NANA	NA	
007	NA	NA	NA	NA	NA	NA	NA	NA	NA	NANA	NA	
601	NA	6-9	2.0	3.0	30	45	NA	NA	30	451000	2000	
604	NA	NA	NA	NA	30	100	15	20	NA	NANA	NA	
605	NA	NA	NA	NA	30	100	15	20	NA	NANA	NA	
901	92[2]											

NOTES:

[1] Data in milligrams per liter except temperature and pH.

[2] No single daily temperature at this station may exceed 92°F. No more than 12 single-day temperature values shall exceed 89°F from June 15 through September 15. No more than 20 seven-day moving average temperature values shall exceed 86.5°F from June 15 through September 15. There shall be at least ....

NA - Not Applicable

SOURCE: NPDES Permit No. 3IB00007

5.3 WASTEWATER

Ohio Edison Niles is responsible for 10 wastewater discharge points to the Mahoning River. Point discharges to the Mahoning River are permitted under the NPDES, Permit No. 3IB00007. The permit, administered by the Ohio EPA, will require renewal in 1992. Ohio Edison Niles operates in compliance with the standards and conditions of the permit, and regularly monitors and reports discharge characteristics. Locations of Ohio Edison Niles discharges to the Mahoning River are shown in Figure 5-1. NPDES outfalls at the Ohio Edison Niles site and wastewater origins are summarized in Table 5-2.

Wastewater characteristics regulated by the NPDES permit include temperature, total residual chlorine, pH, TSS, oil and grease, BOD_5, and fecal coliform. Discharge limits applied to specific outfalls are summarized in Table 5-3.

A once-through cooling water system is utilized for condenser cooling in the Ohio Edison Niles plant. The water is pumped from the Mahoning River and after cooling use is discharged back to the river through Outfall 001. Service water for fly- and bottom-ash sluicing, ash-slag tank overflows, and miscellaneous process uses is also obtained from the river. Sluice water for transporting fly and bottom ash is discharged as supernatant from the ash-treatment ponds through Outfall 002 to the Mahoning River. Boiler make-up water is obtained by processing municipal water with plant ion exchange demineralizers. Sanitary wastes are pumped to on-site treatment plants that provide advanced secondary treatment before discharging to the Mahoning River.

Site stormwater runoff is pumped to the ash pond area before discharge to the Mahoning River. Coal pile runoff drains into an equalization pond and is then pumped to the fly ash pond via a separate pipeline.

An amendment to the existing NPDES permit will not be required for the WSA-SNOX project. The project is essentially a zero-use process in which cooling water is recycled to the Mahoning River via existing Outfall 001. Current limits and monitoring requirements set under the existing NPDES permit will be applicable to the project cooling water discharge.

5.4 FEDERAL AVIATION ADMINISTRATION

The Federal Aviation Administration regulates the construction of structures that may pose a hazard to air navigation. The WSA-2 condensing tower as planned is unlikely to be so categorized, pursuant to 14 USC 77 13 et seq. Because the tower will be considerably less than 200 feet high, and because the three existing tall stacks at the Ohio Edison Niles site are significantly taller than the planned WSA-2 condensing tower, the project is currently considered exempt from Federal Aviation Administration requirements.

5.5 OTHER REQUIRED PERMITS

Trumbull County will issue building and occupancy permits after the project demonstrates compliance with applicable building, electrical, mechanical, plumbing, and fire protection codes.

Ohio Edison maintains an Emergency Procedures manual and Emergency Contingency Plans and Spill Prevention, Containment, and Countermeasure Plans for guarding the site against accidental releases. C-E and Ohio Edison will review these provisions and make appropriate changes to emergency plans to safely accommodate the demonstration project.

6.0 PREPARERS AND PROFESSIONAL QUALIFICATIONS

The following section includes summaries and resumes of principal project members.

The Project Director for preparation of this report is Jeffrey W. Bradstreet, Ph.D., an environmental engineer with 18 years' experience in the direction of chemical, petroleum-refining, synfuel, and environmental programs. Jacqueline Dingfelder is primarily responsible for the preparation of this document. Ms. Dingfelder is a staff scientist with four years of multi-media environmental experience at federal, state, and local levels.

David Asherman, Jeffrey Harrington, and David Dixon assisted in the air, water, and waste impact evaluation. Mr. Asherman is a senior planner with 10 years of experience, primarily in the preparation of environmental impact assessments. Mr. Harrington is a chemical engineer with three years' experience in air quality modeling and monitoring. Mr. Dixon is a professional engineer with over 18 years of experience in conducting air quality impact assessments, evaluating BACT analysis, and compiling emission inventories.

Keith Kohanski and Keith Moe assisted in the fianl preparation of this document. Mr. Kohanski and Mr. Moe are planners with over twenty years of experience between them in land use and environmental planning and regulatory compliance, with broad experience in both the public and private sectors.

The following personnel also provided input to this report:

Mr. William Kingston
Environmental Systems Division
Combustion Engineering
31 Inverness Center Parkway
Birmingham, Alabama 35243

Mr. Michael Hyland
Snamprogetti, USA, Inc.
666 Fifth Avenue
New York, New York 10103

Mr. Dale Kanary
Ohio Edison Company
76 South Main Street
Akron, Ohio 44308

JEFFREY W. BRADSTREET, Ph.D., Director, Air Quality Services

QUALIFICATIONS SUMMARY

Dr. Bradstreet's areas of expertise include environmental chemistry, air toxics, ambient modeling and monitoring, air pollution control technology, environmental permitting, indoor air quality, risk assessment and hazardous waste management. He has over 17 years of experience in the evaluation of environmental risks associated with pollutant waste streams from industrial facilities. His project management experience has included numerous permitting projects, a multisite hazardous waste investigation/remedial action program and a two year multidisciplinary environmental permitting program for a new chemical complex.

EDUCATION

Ph.D./Environmental Engineering, 1972, Syracuse University
M.S./Environmental Engineering, 1969, Syracuse University
M.S./Sanitary Engineering, 1968, Pennsylvania State University
B.C.E./Civil Engineering, 1963, Clarkson College of Technology

RELEVANT EXPERIENCE

Chemical Releases, Air Emissions, Dispersion Modeling, Risk Assessment--Dr. Bradstreet is Project Director for the chemical risk hazard assessment being performed for the Savannah River Laboratory in South Carolina. The project involves: determining the emissions to the atmosphere from various accident scenarios, calculating the dispersion of these emissions, evaluating the exposure of plant employees and nearby residents and assessing the risk associated with these exposures. The project will result in the preparation of a health and safety report for submission to the Department of Energy.

Hazardous Waste Site Investigation/Remedial Action Program, New York--Dr. Bradstreet directed site investigations/remedial action feasibility program for a series of inactive coal-gasification sites for an electric utility. Each study consists of five tasks: 1) preliminary historical investigation and monitoring program design, 2) initial on-site geological and groundwater monitoring, 3) more detailed on-site monitoring, 4) risk assessment based upon monitoring program results and 5) an evaluation and recommendations for remedial actions. The program progressed successfully under Dr. Bradstreet's management.

Environmental Permitting for a New Chemical Complex; Georgia, Alabama--The two-year $7,000,000 budget program, directed by Dr. Bradstreet, included: a site selection study, determination of permits required and associated schedule, an evaluation of all potential waste streams, prediction of environmental impacts and negotiation with federal and state agencies for all environmental permits.

Environmental Permitting of Cogeneration Plant, PA--Project Manager for this grass roots cogeneration plant that required obtaining air, wastewater, waste supply, solid and hazardous waste disposal permits.

BACT Control Technology--Dr. Bradstreet conducted a project for the Massachusetts Department of Environmental Quality Engineering which involved the preparation of a guidelines document for consistent review of BACT assessments. Methodologies were given for PSD NSR control technology assessments as well as the state's review process for new and modified sources.

Evaluation of Flue Gas Desulfurization Technology, Ohio and Pennsylvania-- Performed a technical assessment of flue gas desulfurization control systems for a group of electric utilities. Presented expert testimony in court on ability of systems to control sulfur dioxide emissions. As a result of court testimony a Pennsylvania utility President was freed of charges of criminal neglect.

Environmental Audits, Regulatory Interface--Performed environmental audits of numerous chemical and general manufacturing plants that included site investigation, environmental compliance, assessment of risks and liabilities, and recommendations for risk limitation programs.

Accidental Release; Risk Assessment, Connecticut--Directed an evaluation of and the potential for impact of an accident release at the North Haven facility of Upjohn. Dispersion modeling showed potential impact of assumed accidents which were compared to acceptable exposures. Contingency programs were developed.

Worker Exposure; Risk Assessment, Connecticut--Directed a study of the exposure of workers in a Connecticut DOT facility to potential toxic and carcinogenic pollutants. Assessed the risks and reported results to workers.

BACT Compliance Program for Coating Operation, Massachusetts--Managed a BACT determination for the modifications to the coating operation of General Electric, Turbine Division. Project required emissions determination, control technology assessment, and negotiations with state agencies.

BACT Compliance Program for Coating Operation, New Jersey--Directed a VOC compliance program determination for a coating operation in New Jersey. Project involved: emissions determination, compliance assessment, control technology review, and development of compliance program.

Air Toxics Study at Chemical Facility, Connecticut--Managed a study of potentially toxic emissions from the Wallingford, Connecticut facility of American Cyanimid. Emissions were quantified and speciated; ambient impact was monitored by real-time mobile van; and time-weighted ambient monitoring performed to identify sources and health consequences.

Air Toxics - Risk Assessment, Detroit and Canada--Directed an air quality program for a Big Three automobile manufacturer that involved: an evaluation of odorous and potentially toxic air emissions, real-time assessment of ambient impacts, and an evaluation and recommendation of an appropriate control system. A combined control system consisting of stack height changes, revised ducting and activated carbon beds was installed and is successfully operating.

Air Toxics Control Program, Canada--Managed a control determination program for the Ralston Purina, Mississauga, Canada, pet food plant. Emissions determination and dispersion modeling revealed ambient impacts requiring control. On-site pilot scale test program revealed appropriate control system.

Indoor Air Quality Formaldehyde Exposure, Connecticut--Investigated the formaldehyde levels in a Connecticut home, via indoor sampling and analysis, and testified in court on findings.

Ambient Air Quality Compliance Program, Pennsylvania--Managed an air quality program for a Pennsylvania electric utility that evaluated and recommended an acceptable stack height and monitored for criteria pollutants with a 90% data recovery for a period of one year.

Ambient Air Quality Evaluation Program; Millinocket, Maine--Provided continuing consulting services for a pulp and paper company that included stack height recommendation, air quality impact evaluations, air quality monitoring and public testimony. Company was permitted to operate as a result of this program.

Air Quality Modeling, Monitoring and Permitting; Berlin, New Hampshire--Managed an air quality program for a pulp and paper company that included an ambient impact evaluation and stack height recommendation for a bark fired boiler, an assessment of air quality impacts after applying control techniques and resulted in obtaining necessary environmental permits from state and federal agencies. Expert testimony was presented during this program. All permits were granted.

Environmental Permitting of a Bark-Fired Boiler--Directed an air quality program for a pulp and paper company that included an evaluation and stack height recommendation for a new bark-fired boiler, an assessment of the air quality impacts and resulted in obtaining the necessary environmental permits from state and federal agencies. Expert testimony was presented during this program.

DAVID W. ASHERMAN, AICP, Manager, Environmental Planning and Permitting

QUALIFICATIONS SUMMARY

Mr. Asherman's areas of expertise include environmental and land use planning, development of environmental licensing programs, and environmental impact analyses. He is a certified planner with over eight years of experience in conducting permit acquisition programs and preparing environmental impact statements for industrial, commercial, residential, and solid waste projects. His educational background in geology and coastal resource management provide him with unique insight into the capabilities and role of ABB Environmental's other disciplines on large multidisciplinary projects.

EDUCATION

M.S./Coastal Resource Management, 1982, Florida Institute of Technology
B.S./Geology, 1975, State University of New York at Oneonta

PROFESSIONAL LICENSES

Member American Institute of Certified Planners (AICP)

RELEVANT EXPERIENCE

Paper Mill Expansion DEIS; South Glens Falls, New York--Mr. Asherman co-authored a Draft Environmental Impact Statement (DEIS) for the expansion of a paper mill owned by the Crown Zellerbach Corporation. The DEIS addressed both the major expansion of the South Glens Falls Mill and a screening study for a new landfill for mill wastes. Issues addressed included land use, public services, air quality, geology, biology, water quality and traffic.

Solid Waste Disposal/Alternatives Analysis/Landfill Closure--The Town of St. George, Maine, contracted with ABB Environmental to provide solid waste planning and Engineering services. Mr. Asherman served as Project Manager and lead planner for preparing a closure plan for the Town's landfill and studying alternative solid waste disposal strategies. The landfill had been ordered closed by the Maine Department of Environmental Protection for non-compliance with solid waste regulations. As part of the services provided to the town, ABB Environmental evaluated alternative solid waste handling strategies which included: developing a new landfill; constructing a transfer station to ship waste to regional disposal or incineration facilities; recycling; and direct hauling.

New York State Electric and Gas Corporation, Land Use Surveys--As part of a ABB Environmental project team investigating former coal gasification sites, Mr. Asherman has conducted several land use surveys covering the areas within one-half mile within each site. In addition to mapping land uses and land cover, Mr. Asherman identified potential contributors of chemicals to ground and surface water, and sensitive receptors.

Environmental Licensing, Paper Mill Expansion Project--Madison Paper Industries retained ABB Environmental to assist in the acquisition of all environmental approvals required for a major mill expansion. The project included an additional paper machine groundwood mill expansion, and doubling the capacity of a municipal wastewater treatment plant. Mr. Asherman served as Project Manager and coordinated the activities of multiple contractors. He was responsible for establishing and maintaining agency contact, preparation of permit applications, and advising the client on various permitting strategies available. Permits required included NPDES, PSD, Maine Site Location of Development, U.S. Army Corps of Engineers, and Maine Natural Resources Protection Act.

Landfill Expansion-Visual Impact Analysis, International Paper Co.--As part of permitting an ABB Environmental designed landfill expansion, Mr. Asherman developed a visual impact analysis (VIA) methodology. The VIA was required by state regulators in order to determine the impact the proposed expansion would have on surrounding areas. The VIA included identification of areas from which the landfill would be visible, preparation of photo-renderings of the closed out landfill, and recommendations for reducing the visual impacts of the project.

Environmental Baseline, Impact Assessment and Licensing Program, Northern Peat Energy Project; Penobscot County, Maine--For this peat mining project involving the wet mining and processing of 4,500 acres of peatland areas in central Maine, ABB Environmental was responsible for obtaining federal, state, and local permits. Mr. Asherman's responsibilities on the project team included preparation of the environmental issues scoping and coordination of in-house and subcontracted baseline studies and impact evaluations. Because this project was to be funded in part by the U.S. Synthetic Fuels Corporation (SFC), an Environmental Monitoring Plan Outline was required for inclusion in the financial assistance agreement. Mr. Asherman was responsible for preparation of the 300 page outline and addendum which described the baseline, operational and post operational monitoring efforts which would be undertaken to comply with SFC regulations.

Bark Processing and Storage Facility--Flo-Jo Contracting, Inc., retained ABB Environmental to assist in the design and development of a facility to process and store waste bark generated from paper mill operations. In addition to serving as project manager, Mr. Asherman was responsible for evaluating multiple potential facility locations for compatibility with Maine Solid Waste Regulations. Following selection of an appropriate site, ABB Environmental developed a facility layout plan and provided civil and structural engineering design services for the proposed building. The facility currently in operation provides 32,000 square feet of enclosed processing and storage space. Mr. Asherman successfully obtained the solid waste permits for the facility, the first of its kind in Maine.

Oil and Hazardous Waste Storage Facility Permitting--Jetline Services, Inc., a major handler of waste oil and petroleum products retained ABB Environmental to design and permit improvements to an existing waste oil storage facility. The new facilities included buried and above ground storage tanks; synthetic liners; fire suppression systems; containment structures; and collection and treatment of runoff. Mr. Asherman was responsible for preparing both the waste oil storage facility and hazardous waste storage facility applications submitted to the State of Maine.

Environmental Baseline, Impact Assessment and Licensing Program, Mount Chase, Mining Project--ABB Environmental was retained by the Getty Mining Company to prepare environmental and regulatory permits for constructing, operating and reclaiming an underground zinc, lead and copper mine. As part of this project, our staff directed a three stage application process pursuant to Maine Land Use Regulation Commission (LURC) guidelines. The process consisted of: pre-application conferences with state agency representatives; development of an Application Preparation Plan (APP) for agency review and comment; and application and environmental assessment submittals. The APP prepared by Mr. Asherman identified the nature and timing of efforts to be undertaken to support permit applications.

Emergency Planning, Maine Yankee Atomic Power Company; Wiscasset, Maine--ABB Environmental has been providing emergency planning assistance to Maine Yankee since 1980. Mr. Asherman has coordinated ABB Environmental's activities since 1984. The emergency planning area encompasses twenty communities and portions of three counties. Mr. Asherman's responsibilities have included conducting community training programs, demographic studies, evacuation planning, updating state and local radiological incident plans and maintaining positive community relations.

Multifuel Boiler Project Permitting--Lincoln Pulp and Paper Company retained ABB Environmental to conduct a solid waste management study on the site of a 100+ year old paper mill. The site includes a 180 feet high bark pile. As part of the cleanup program the mill is currently installing a multifuel boiler and fuel preparation area to reclaim bark as fuel. Mr. Asherman was responsible for preparation of the required environmental permits for the project.

U.S. Army Corps of Engineers Permit, Emhart Corporation; Shelton, Connecticut--For this hazardous waste site remediation project Mr. Asherman was responsible for obtaining Corps of Engineers approval for altering freshwater wetlands and for dredging and installing riprap along the Housatonic River. He was also responsible for coordinating with a subcontractor to obtain the approval of the local freshwater wetlands board.

Signal Environmental Systems Inc., Facility Site Analysis--Mr. Asherman has managed several projects in Maine and New Hampshire which included preliminary site analyses for siting proposed waste to energy facilities. These studies have included field reconnaissance of geological and biological conditions, availability of utilities, identification of sensitive land use, and permit audits.

DAVID W. DIXON, P.E., Manager, Air Quality Engineering

QUALIFICATIONS SUMMARY

Mr. Dixon developed state regulations enacting the Prevention of Significant Deterioration (PSD) requirements. He has developed control strategies to bring non-attainment areas into compliance. He has evaluated BACT analyses and air quality impact assessments, compiled emission inventories, conducted air quality studies, and developed compliance assurance.

EDUCATION

B.S./Civil Engineering, 1970, University of Maine, Orono
Air Pollution Control Specialty Courses
Management Training

PROFESSIONAL LICENSES

Registered Professional Engineer - Maine

RELEVANT EXPERIENCE

Manager of Engineering for Clean Harbors Environmental Engineering Corporation - Mr. Dixon established a Maine Regional Engineering Office to provide engineering support to Clean Harbors's Maine facilities and consulting services to clients. He represented Clean Harbors and clients before the Maine Department of Environmental Protection. In addition, Mr. Dixon prepared applications for local permits and DEP licenses, and he developed spill contingency and waste handling plans.

Director of Licensing and Enforcement for the Maine Department of Environmental Protection, Bureau of Air Quality Control - Mr. Dixon was responsible for licensing and enforcement programs, including conducting control technology evaluations (BPT, BACT, LAER, RACT) and evaluating air quality impact assessments. Mr. Dixon directed the source surveillance and stack sampling programs, prepared or reviewed all draft-air emission licenses and consent agreements, and presented the staff recommendations to the Board of Environmental Protection. He managed the licensing process for permitting Maine's major municipal solid waste combustors.

Director of Technical Services for the Maine Department of Environmental Protection - Mr. Dixon was responsible for program planning and development of regulations and revisions to the Maine State Implementation Plan (SIP). His duties included managing a technical staff, coordinating activities with the U.S. EPA, negotiating grants, and supervising expansion and quality assurance procedures for a laboratory. He prepared the Maine State Implementation Plan (SIP) and corresponding regulations to promulgate Prevention of Significant Deterioration (PSD) provisions for conducting new source review. He directed the development of technical and legal adoption of control strategies for non-attainment areas.

Assistant Engineer for the Maine DEP Bureau of Air Quality Control - Mr. Dixon was responsible for conducting ambient air monitoring and source inspections. His duties included operation and calibration of field sampling equipment, data evaluation and reporting, investigating complaints, and determining compliance through source inspections.

PROFESSIONAL AFFILIATIONS

Air and Waste Management Association, Board of Directors, New England Section, elected 1988

PUBLICATIONS

"Recycling of Waste Oil," Conference Proceedings, Air and Waste Management Association, February 1989.

"An Approach to Setting a Sulfur Standard for Coal," Samuel S. Butcher and David W. Dixon, Journal of the Air Pollution Control Association, Volume 31, No. 6, June 1981.

"The Development and Assessment of a Sulfur Dioxide Control Strategy for a Metropolitan Area and its surroundings," Kenneth Skipka and David W. Dixon, Proceedings of the 4th Joint Conference on Sensing of Environmental Pollutants, November 11, 1977.

JEFFREY R. HARRINGTON, Environmental Engineer

QUALIFICATIONS SUMMARY

Mr. Harrington's experience as an environmental engineer includes model development, air quality dispersion modeling, air emission inventories, and applied statistics. Mr. Harrington has also conducted acid precipitation and particulate monitoring programs as well as measurements of the dry deposition of trace metals onto natural and surrogate surfaces. His graduate research focused on the scavenging of acidic particles from the atmosphere by snow while his graduate training provided a broad background in air and water chemistry, environmental modeling, and groundwater hydrology and chemistry. Mr. Harrington has since guided the technical development of a model that predicts the fate and treatability of hazardous wastes in wastewater treatment plants, conducted air quality dispersion modeling for permitting and feasibility studies, and performed statistical analyses of monitoring data to establish monitoring programs at RCRA and CERCLA sites.

EDUCATION

M.S./Environmental Engineering, 1988, Carnegie Mellon University
B.S./Chemical Engineering, 1984, Stanford University

RELEVANT EXPERIENCE

FATE Model Development--Mr. Harrington managed the technical development of the Fate and Treatability Estimator (FATE) model, which predicts the removal of organic and inorganic compounds in publicly owned treatment works (POTWs). EPA's Industrial Technology Division (ITD) supported the development of the model for POTW operators and feasibility study writers to evaluate CERCLA discharges to POTWs. Mr. Harrington was responsible for calibration and validation of the model and coordinated with software developers to design a user-friendly PC-based product.

Dispersion Modeling--Mr. Harrington conducted the dispersion modeling required for an amendment to a Maine paper mill's air emissions license. Responsibilities included assessing stack emissions from existing and proposed boilers, conducting dispersion modeling with ISCST and Complex I, and evaluating modeled ambient and PSD impacts. The modeling analysis was incorporated into an application to amend air emissions license for submittal to the Maine Department of Environmental Protection.

Dissolved Oxygen Evaluation--Mr. Harrington evaluated two proposed designs for the oxygenation of a Maine river with a dissolved oxygen deficit. The proposed methods included sidestream oxygenation and bubble diffusion. The evaluation assessed the ability of each system to provide sufficient oxygen to the river, as well as the adverse ecological impacts caused by each system. Although bubble diffusion provided less efficient oxygenation, the method was proposed to a Maine paper mill because it provided sufficient oxygen and exhibited minimal ecological impacts.

RCRA Groundwater Monitoring, Statistical Evaluation--Mr. Harrington designed the statistical evaluation of historical groundwater monitoring data from a Maine paper mill landfill site. The evaluation was conducted to determine whether significant differences in chemical concentrations existed between wells. The results of the statistical evaluation were used to assess whether significant differences were the result of landfill operations or other sources.

VOC Emissions Evaluation, Dispersion Modeling--Mr. Harrington evaluated the emissions and dispersion of VOCs from excavation and land treatment activities at the Massachusetts Military Reservation. The excavation and subsequent land treatment involved soils contaminated with chlorinated organics. The evaluation was conducted to demonstrate compliance with Massachusetts Acceptable Ambient Limits and OSHA standards.

RCRA Groundwater Monitoring, Statistical Evaluation--Mr. Harrington designed the statistical evaluation of monitoring data from proposed groundwater monitoring networks at a Vermont RCRA facility. Ten compliance zones were proposed, each with upgradient (background) and downgradient (compliance) wells. Historical monitoring data was evaluated for trend, seasonality, and distributional assumptions which facilitated the development of the proposed statistical program. Control charts were recommended for the detection of significant trends and confidence intervals were proposed for comparison with groundwater protection standards.

Environmental Information Volume (EIV) and Environmental Monitoring Plan Outline (EMPO)--Mr. Harrington prepared the air quality sections of the draft documents for the Department of Energy (DOE) as part of DOE's Innovative Clean Coal Technology program. Responsibilities included evaluating existing ambient air quality and ambient air impacts, as well as reviewing, permitting, and monitoring requirements. The EIV outlined potential impacts associated with retrofitting an existing coal-fired power plant with an advanced flue gas treatment technology. The EMPO outlined the monitoring requirements associated with the advanced flue gas treatment technology.

VOC Emissions Inventory--Mr. Harrington evaluated VOC emissions from a Mobil Chemical Company research facility. The evaluation involved calculating and reporting a complete inventory of VOC emissions during 1988 to the New Jersey Department of Environmental Protection (NJDEP). Additionally, certain VOC emissions were reported to the EPA under the guidelines of SARA Title III. Mr. Harrington was responsible for completing the inventory and drafting the necessary forms.

VOC Emissions Evaluation--Mr. Harrington produced source and ambient VOC air quality data associated with a medical glove manufacturing facility. The data was required for the evaluation of potential health risks and a presentation at a public hearing.

Air Quality Monitoring--Mr. Harrington managed field operations of a PM10 monitoring station and coordinated laboratory analyses. Responsibilities included filter replacement, calibration and maintenance of high volume air samplers, and coordination of laboratory analyses.

ACL Demonstration, Statistical Analysis--Mr. Harrington performed a detailed statistical analysis of the distribution of chemicals leaching into groundwater from a Maine Superfund site. The analysis included assessing the statistical distribution of concentrations of chemicals as certain monitoring stations in order to determine the magnitude of attenuative mechanisms occurring in the groundwater. The analysis was then used to establish alternate concentration limits (ACLs) at specified compliance points in the landfill. The ACLs were proposed to USEPA Region I in the form of a report that demonstrated the protection of public health and the environment.

Groundwater, Surface Water, and Sediment Monitoring--Mr. Harrington managed the quarterly monitoring at a Maine Superfund Site. The monitoring program required coordinating sampling efforts for 100 monitoring stations, and laboratory analysis for volatile and semivolatile organic compounds and inorganic compounds. Data was validated, summarized and interpreted in the form of a report submitted to the USEPA on a quarterly basis.

Corrective Measures Study--Mr. Harrington participated in writing a corrective measures study (CMS) for a Vermont RCRA facility. The CMS screened corrective action alternatives for groundwater and soils contamination and provided treatability study recommendations to assess preferred corrective action alternatives.

GEP Stack Height, Dispersion Modeling--Mr. Harrington performed the dispersion modeling assessment of a revised GEP determination for the Madison Paper Industries. EPA Region I had reviewed the GEP determination of a previous mill modification, determined that the stack height was too high and requested a resubmittal. Mr. Harrington evaluated the effect of changing the allowable stack height on the modeled ambient impact.

VOC Emissions, Emissions Inventory--Mr. Harrington evaluated air and VOC emissions from the research facility of Mobil Chemical. The evaluation involved calculating and reporting all air emissions to the NJDEP and certain VOC emissions during 1987 to the EPA under SARA Title III. Mr. Harrington was responsible for completing the inventory and drafting the forms.

Research Assistant, Department of Civil Engineering, Carnegie Mellon University--Mr. Harrington investigated the scavenging of acidic aerosols over the Greenland ice sheet. Computer modeling was used to describe seasonal variations of atmospheric concentrations. The project included two expeditions to Greenland for the collection of samples which included filtering for trace levels of sulfate, nitrate, and nitric acid vapor.

KEITH D. KOHANSKI, Planner

QUALIFICATION SUMMARY

Mr. Kohanski brings to ABB Environmental a broad public sector experience in land use planning and regulatory compliance. He is a trained planner and landscape architect with specific experience in land use planning, regulatory review, landscape design, commercial residential and industrial site evaluation, and land use policy development. His educational and public sector experience has proven to be a valuable resource in the realization of project goals and objectives.

SPECIALIZED SKILL AREAS

Regulatory Assessment
Regulatory Analysis
Planning Studies
Permitting
EIS Preparation/Review
Landscape Architecture

RELEVANT EXPERIENCE

ABB Environmental, January 1990 - present

LURC Rezoning Petition, Solid Waste Landfill Project, Lincoln Pulp and Paper Co., Inc., Jay, Maine - As part of a comprehensive waste management plan, ABB Environmental was responsible for the preparation of the Maine Land Use Regulation Commission's (LURC's) Rezoning Petition for a change in the current development designation for the siting of a Lincoln Pulp and Paper Mill solid waste landfill. Mr. Kohanski was responsible for gathering the required information and preparing the petition document.

Preliminary Information Report, Landfill Expansion Project, International Paper Co., Jay, Maine - For International Paper Company's landfill expansion project, ABB Environmental was responsible for obtaining required federal, state, and local permits. Mr. Kohanski was responsible for compiling the information report for submittal to the Maine Department of Environmental Protection.

Regulatory Review, Jug End Development, Egremont, Massachusetts - As part of the ABB Environmental team, Mr. Kohanski was responsible for identifying the applicable federal, state and local permits for the client's two hundred unit residential and commercial development.

Planning Director, City of Westbrook, Maine - As planning director for this suburban city of 15,000, Mr. Kohanski reviewed numerous residential, commercial and industrial development proposals for statutory and local regulatory compliance and environmental impact. He also assisted the City in formulating local land use policies and ordinances and developed and enhanced his working familiarity with the procedural, legal and practical elements of the public decision-making process.

Comprehensive Plan, Town of Littleton, New Hampshire - Mr. Kohanski was project manager for the preparation of a comprehensive plan for the Town of Littleton, New Hampshire. The projects included the development of land use policies based on a community-wide survey, socio-economic trends, environmental sensitivity, and federal and state mandates.

OTHER

General Development Plan, Cicero, New York - As part of a project team, Mr. Kohanski was responsible for developing an industrial development policy as well as designing an industrial park for the city.

Commercial Strip Development Manual, Syracuse, New York - Mr. Kohanski researched and produced a manual for the development of commercial areas that demonstrated how to avoid the inherent problems of strip development.

EDUCATION

M.L.A./Landscape Architecture, 1986, State University of New York at Syracuse
M.A./Adult Education, 1980, University of Rhode Island
B.S./Agricultural Resource Technology, University of Rhode Island

PROFESSIONAL AFFILIATIONS

American Planning Association
Maine Association of Planners

KEITH V. MOE, Planner

QUALIFICATIONS SUMMARY

Mr. Moe brings to ABB Environmental broad private and public sector experience in land use and environmental planning and regulatory compliance. He is a trained planner with specific experience in regulatory research; impact analysis; and permit acquisition for energy, solid waste, residential and commercial projects; as well as experience in land use and environmental policy development at the local and state levels. Building on a diverse academic background in applied land use planning, legal and policy analysis, environmental sciences, and archaeology, his work in private consulting and public service gives him a dual perspective valuable in bringing clients' projects to fruition.

SPECIALIZED SKILL AREAS

Environmental Impact Assessment
Permitting
Regulatory Assessment
Site Screening Studies
Constraints Mapping
Visual Impact Assessment
Policy Analysis

EXPERIENCE

ABB ENVIRONMENTAL SERVICES, INC., Portland, Maine September 1988 to Present
Planner

As a planner in the Planning and Permitting Department, Mr. Moe is responsible for environmental and land use permit acquisition, regulatory assessments, siting analyses, and other planning studies in support of a wide range of industrial, commercial, and residential development projects.

Environmental Assessment and Licensing, Sludge/Ash Landfill, Penobscot County, Maine--Mr. Moe participated in the preparation of multiple permit applications to Maine Department of Environmental Protection (MEDEP) and Maine Land Use Regulation Commission for a new landfill to safely dispose of paper mill wastes. His responsibilities included preparation of a scenic impact analysis.

Permitting/Data Assessment, Metallic Ore Mining Project, Aroostook County, Maine--For Boliden Resources, Inc., he participated in the detailed evaluation of voluminous prior environmental documentation on a long-proposed major copper/zinc/gold/silver mining project in northern Maine. He assessed data to determine compliance with current environmental permit application requirements, prepared detailed summaries of application requirements, and offered detailed recommendations for further data collection.

Environmental Assessment and Licensing, Regional Mall, Augusta, Maine--For Melvin Simon and Associates, he played a lead role in preparing applications for a Site Location of Development Permit and Natural Resources Protection Act Permit to MEDEP for a major regional mall project in the state capital.

Environmental Assessment and Licensing, Retail Development, Portland, Maine--For CBL & Associates/New England, Mr. Moe had primary responsibility for preparing a Site Location of Development Permit application to MEDEP, Section 404 wetlands notification to U.S. Army Corps of Engineers, and a Site Plan Review application to the City of Portland, for a new 104,000-square-foot retail facility.

Regulatory Assessment and Permitting Schedule for Generic Maine Fossil Power Plant--For Cianbro Corp., Mr. Moe produced a generic regulatory assessment and permitting schedule for a grassroots fossil-fired cogeneration or small power plant in Maine.

Environmental Assessment and Licensing, Woodchip Production Facility, Milford, Maine--For James River Corp., he prepared a Site Location of Development Permit application to MEDEP for a new debarking facility and site development at an existing 20-acre woodchip production plant.

Coastal Wetland Permitting, Maine Yankee Atomic Power Company Wiscasset, Maine--He prepared a Maine Natural Resources Protection Act Permit application to MEDEP for a new sewer project crossing a coastal wetland area near the Maine Yankee Atomic Power Plant.

Environmental Assessment and Licensing, Wastewater Treatment Plant Expansion, Anson, Maine--He had key responsibility for preparing a Site Location of Development Permit application to MEDEP for the two-fold expansion and modernization of Anson-Madison Sanitary District's wastewater treatment facility adjacent to the Kennebec River in Anson and Madison, Maine.

Visual Impact Analysis, Paper Mill Landfill Expansion, Jay, Maine--For International Paper Co., Mr. Moe played a lead role in preparing a detailed visual impact analysis of a proposed 14-acre paper mill expansion at IP's Androscoggin Mill.

Environmental Baseline, Impact Assessment, Monitoring Plans, and Licensing Program-As an ABB Environmental team member supporting Combustion Engineering's Fossil Systems group, Mr. Moe studied environmental conditions, assessed potential impacts, developed preliminary monitoring plans, and initiated licensing activities for an integrated coal gasification combined-cycle (IGCC) demonstration project in Springfield, Illinois. This commercial-scale demonstration, sponsored by Combustion Engineering, U.S. Department of Energy (DOE), Illinois Department of Energy and Natural Resources, and City Water, Light and Power under the federal Innovative Clean Coal Technology program, involves the repowering of an existing power station, generating up to 120 MW of electricity and achieving low air-pollutant emissions and a low plant heat rate.

Mr. Moe played a key role in producing an Environmental Information Volume and Environmental Monitoring Plan Outline, which detailed baseline environmental conditions, evaluated potential environmental effects of several operating scenarios, and identified permitting requirements and outlined a preliminary environmental monitoring program, pursuant to DOE regulations and the National Environmental Policy Act.

Regulatory Review/Permitting Assessment and SEQR Initiation, Schoeller Technical Papers, Pulaski, New York--To supply material for the closure of a sludge lagoon, Schoeller plans to open a sand and gravel mine on their property in Richland, New York. Supporting ABB Environmental disciplines in geotechnical and civil engineering, Mr. Moe reviewed and summarized applicable state, federal, and local regulations and assisted in preparing a complete Environmental Assessment Form (EAF) for the 50-acre mining project. The EAF initiates the New York State Environmental Quality Review (SEQR) process.

Regulatory Review/Permitting Assessment, James River II, Inc., South Glens Falls, New York--James River engaged ABB Environmental to design a fast-tracked emergency stabilization program for a partially collapsed abandoned limestone mine underlying a portion of James River's property and threatening future use of the site through severe subsidence. *In support to ABB Environmental's Geotechnical Engineering Department*, he reviewed applicable state, federal, and local regulations, contacted regulatory officials, and summarized findings in a written report appended to the geotechnical engineering document. SEQR applicability was a key issue in this permitting assessment.

Environmental Assessment and Licensing, Mill Woodyard Modernization Project, Great Northern Paper Co., East Millinocket, Maine--For the modernization and expansion of this paper mill's wood storage and handling areas, ABB Environmental was responsible for preparing a Site Location of Development Permit application to the MEDEP. This application addressed all construction and improvements at the mill site since 1970. He assisted in the environmental assessment of this multi-faceted project and prepared the permit application.

Environmental Assessment and Licensing, Multi-fuel Boiler and Fuel Handling System Project, Lincoln Pulp and Paper Co., Lincoln, Maine--For this paper mill project involving a new multi-fuel boiler and fuel handling system, ABB Environmental was responsible for preparing a Site Location of Development Permit application to MEDEP. This application also included all mill improvements since 1970. Mr. Moe played a lead role in the environmental assessment and preparation of the permit application, and coordination of application processing.

TOWN OF GORHAM, MAINE **August 1986 - August 1988**
Planning Director

As planning director of this suburb of 12,000 population and 54 square miles, Mr. Moe reviewed numerous residential commercial, and industrial development proposals for statutory and local regulatory compliance and environmental impact; assisted the community in formulating local land use policies and ordinances; and developed a working familiarity with the legal, procedural, and political elements of public decision-making.

BROWN, VENCE & ASSOCIATES, **San Franciso, California November 1984 - September 1985**
Environmental Planner

For this energy and environmental engineering firm, he was responsible for environmental impact evaluation, permitting activities, and regulatory compliance assessments for projects involving resource recovery (municipal solid waste, woodwaste), cogeneration, hydropower, and solid waste management.

Feasibility Study and Preliminary Environmental Impact Analysis, Resource Recovery Facility, Mercer County, Pennsylvania--As a project team member studying the feasibility of a 245 ton-per-day waste-to-energy facility with a wastewater sludge codisposal option in western Pennsylvania, Mr. Moe was responsible for preliminary environmental impact analysis and project regulatory assessment and compliance. During this project he coordinated closely with state, regional, and local regulatory bodies. Topics studied included air quality, water quality, residue management, and waste supply and characterization.

Feasibility Study and Preliminary Environmental Impact Analysis, Infectious Waste Treatment Facility, San Francisco, California--For the city and county of San Francisco and Sanitary Fill Inc., Mr. Moe conducted a regulatory assessment and preliminary environmental impact analysis for the feasibility review of a 4 ton-per-day infectious waste incineration facility.

Cogeneration/Incineration Projects Permit Acquisition, Hospital Consortium of San Mateo, California--Mr. Moe was responsible for acquiring local, state, and federal approvals for solid/infectious waste incineration/cogeneration projects for three hospitals in the San Francisco Bay area.

Regulatory Compliance and Fuel Supply Studies, Biomass Power Facilities, California--As part of engineering confirmation studies for a major New York financial institution and a California energy development company, Mr. Moe evaluated regulatory compliance and fuel supply of woodwaste-to-energy facilities ranging in size from 9 to 18 MW in Butte, Fresno, Lassen, Shasta, and Tuolumne counties, California.

Regulatory Compliance Study, Waste Coal Power Facility, San Bernardino County, California--As part of an engineering confirmation study, Mr. Moe evaluated regulatory compliance and environmental quality management plans for a 14.5 MW power plant fueled by waste coal fines from slurry in Ivanpah, California.

Feasibility Studies, Cogeneration Facility, County of Santa Clara, California--As part of overall feasibility studies for this 3.7 MW urban power facility, Mr. Moe evaluated project siting and environmental factors and assessed regulatory requirements.

Environmental Impact Analysis, Supply Creek Hydropower Project, Hoopa Valley Indian Reservation, California--For this hydropower project license application to the Federal Energy Regulatory Commission, Mr. Moe reviewed environmental baseline data and evaluated project impacts and mitigation measures.

GREATER EGYPT REGIONAL PLANNING AND DEVELOPMENT COMMISSION, Carbondale, Illinois
June 1983 - August 1983
Planning Assistant

For this regional planning agency in Southern Illinois, Mr. Moe structured and conducted a program of policy and legal research and analysis for an Illinois EPA program studying Illinois oil field brine disposal issues.

BECHTEL GROUP, INC., San Francisco, California August 1980 - June 1982, September 1984 - November 1984
Technical Writer

Mr. Moe, with responsibility for the production of more than 50 technical documents for this multinational engineering firm, became conversant in environmental quality assessment and planning; conventional and advanced power and fuel technologies; and energy economics and planning.

EDUCATION

M.C.P./Land Use and Environmental Planning, 1984, University of California, Berkeley
B.A., summa cum laude and Phi Beta Kappa,/Anthropology, 1979, Beloit College.

ADDITIONAL COURSEWORK

Graduate study/Archeology and Anthropology, University of California, Santa Barbara, 1979 - 1980

PROFESSIONAL AFFILIATIONS

American Planning Association
National Association of Environmental Professionals
Maine Association of Planners

PRESENTATIONS

Session speaker, 1983 Proceedings, Association of Illinois Soil and Water Convervation Districts and Illinois Department of Agriculture, "Legal and Policy Facets of Oil Field Brine Disposal"

Date of Update: 7/30/90

JACQUELINE DINGFELDER, Planner

Qualifications Summary

Ms. Dingfelder has over four years of experience in the environmental field. She is trained as a planner with specific experience in participatory planning, environmental impact analysis, land use planning, and policy analysis. She has worked extensively with federal, state and local officials, and citizen and public interest groups through her work with U.S. EPA's Superfund public involvement program.

Education

M.R.P./Land Use and Environmental Planning, 1985, University of North Carolina, Chapel Hill
B.A./Geography, 1982, University of California, Los Angeles

Professional Planners

American Planning Association
Maine Association of Planners

Relevant Experience

Emergency Planning, Maine Yankee Atomic Power Plant, Wiscasset, Maine--Ms. Dingfelder provides emergency planning assistance to the Maine Yankee Atomic Power Company and to the Maine Emergency Management Agency Plant. The emergency planning area encompasses sixteen communities and portions of three counties. Ms. Dingfelder's responsibilities include assisting and coordinating local programs, updating State and local radiological incident plans, reconfiguration of notification route maps and maintaining positive community relations.

Environmental Information Volume, Department of Energy, Ohio Edison Niles Power Plant; Niles, Ohio--Ms. Dingfelder prepared an Environmental Information Volume (EIV) for the Department of Energy (DOE) as part of DOE's Innovative Clean Coal Technology program. The EIV outlined potential impacts associated with retrofitting an existing coal-fired power plant with an advanced flue gas cleanup technology.

Public Participation Planning and Implementation, U.S. EPA, Chicago, Illinois--Ms. Dingfelder assisted U.S. EPA in developing and implementing public involvement programs at over fifty Superfund sites throughout the midwest. Her responsibilities included: developing community relations plans which outlined procedures to help ensure that proposed Superfund actions met with community acceptance; preparation of fact sheets, information updates, and news releases that summarized and translated complex technical information into terms understandable to the general public; coordinating community relations activities with U.S. EPA, the technical contractor team, and state and local agencies;

and providing public meeting assistance including presentations, documentation of public comments and questions, and preparing public meeting summaries.

Environmental Assessment, Water Project--As a Research Assistant for the North Carolina Water Resources Institute, Ms. Dingfelder prepared a report assessing the impacts of a proposed regional water use project.

Assessment of Incineration of Hazardous Wastes at Sea, U.S. EPA, Washington, D.C.--As a Policy Analyst at the Office of Policy, Planning, and Evaluation, Ms. Dingfelder helped prepare an EPA study assessing citizen concerns regarding incineration of hazardous wastes at sea. Ms. Dingfelder conducted extensive interviews with citizen groups, industry, and state/regional regulatory agencies in preparation of the study.

Additional Experience

For the National Park Service, Ms. Dingfelder prepared a report outlining key coastal issues and recommending land use options for coastal areas along the Santa Monica Mountains National Recreation Area.

7.0 AGENCIES AND PERSONS CONSULTED

Bureau of Indian Affairs; Washington, DC; Public Information Officer: (202)343-2315.

City of Niles Building Department; Niles, Ohio; Mr. Rose: (216)652-7361.

Eastgate Development and Transportation Agency; Youngstown, Ohio; Edward Deley (Urban Systems Engineer): (216)746-7601.

Ohio Department of Natural Resources, Comprehensive Planning Section, Office of Outdoor Recreation Services; Columbus, Ohio; William Daehler (Program Administrator): (614)466-7170.

Ohio Department of Natural Resources, Division of Groundwater Resources; Columbus, Ohio; Jim Raab: (614)265-6739.

Ohio Department of Natural Resources, Division of Natural Areas and Preserves, Natural Heritage Program; Columbus, Ohio; Pat Jones (Data Management Supervisor): (614)265-6453.

Ohio Department of Natural Resources, District Office, Division of Soil and Water Conservation; Cortland, Ohio; Floyd McCleary (Resource Soil Scientist): (216)637-7645.

Ohio Department of Transportation, Division of Highways, District 4; Columbus, Ohio; Bob Smith: (614)466-7170.

Ohio Edison, Environmental and Special Projects Department; Akron, Ohio; Dale Kanary: (216)384-5744; Rita Bolli: (216)384-4901.

Ohio Environmental Protection Agency Air Pollution Control Division; Columbus, Ohio; Gary Engler: (614)6440-2322.

Ohio Environmental Protection Agency, Northeast District Office, Water Division; Twinsburg, Ohio; Bob Davic: (216)425-9171.

Ohio Environmental Protection Agency, Northeast District Office, Air Pollution Control Division; Theodore Davis: (216)425-9171.

Ohio Historic Preservation Office, Review and Compliance Department; Columbus, Ohio; Julie Kime (Program Assistant): (614)297-2470.

Ohio Historical Society; Columbus, Ohio; Donald Bier (Emergency Archaeologist): (614)297-2300.

RCRA Superfund Hotline; Sean White: (800)424-9346.

Trumbull County Planning Commission; Warren, Ohio; Edward Kuteva (Director), Alan Knapp (Planner): (614)841-0480.

Weatherfield Township Building Department; Weatherfield, Ohio; Dave Roulan: (216)652-6326.

GLOSSARY OF ACRONYMS AND ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
AQCR	air quality control regions
BOD_5	five-day biological oxygen demand
Btu	British thermal unit
C-E	Combustion Engineering, Inc.
CEQ	Council on Environmental Quality
cfm	cubic feet per minute
cfs	cubic feet per second
DO	dissolved oxygen
DOE	U.S. Department of Energy
DOI	Department of Interior
EHSS	Environmental, Health, Safety, and Socioeconomic
EIV	Environmental Information Volume
EP	Extraction Procedure
EPA	Environmental Protection Agency
ESP	electrostatic precipitator

GLOSSARY OF ACRONYMS AND ABBREVIATIONS

(continued)

FEMA	Federal Emergency Management Agency
gpm	gallons per minute
hr	hour
H_2	hydrogen
H_2O	water
ICCT	Innovative Clean Coal Technology
ISC	Industrial Source Complex
ISCLT	Industrial Source - Long Term
ISCST	Industrial Source - Short Term
km	kilometer
lb	pound
l	liter
mg	milligram
mgd	million gallons per day
MMBtu	million British thermal units
MW	megawatts
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act

GLOSSARY OF ACRONYMS AND ABBREVIATIONS

(continued)

NH_3	Ammonia
Nm^3	normal cubic meters
NO	Nitrogen Oxide
NO_2	Nigrogen Dioxide
NO_x	Nitrogen Oxides
NPDES	National Pollution Discharge Elimination System
NSPS	New Source Performance Standards
ODNR	Ohio Department of Natural Resources
OSHA	Occupational Safety and Health Administration
O_2	Oxygen
PAH	polynuclear aromatic hydrocarbons
PEIA	Programmatic Environmental Impact Analysis
P-G	Pasquill-Gifford
PM_{10}	particulate matter $<10\mu m$ in aerodynamic diameter
PON	Program Opportunity Notice
ppm	parts per million
PTFE	polytetrafluoroethylene
PTPLU	Point Plume Air Quality Screening Model
RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act of 1986
scfm	standard cubic feet per minute

GLOSSARY OF ACRONYMS AND ABBREVIATIONS

(continued)

SCR	selective catalytic reduction
SIP	state implementation plan
SNOX	Sulfur and Nitrogen Oxides
SO_2	sulfur dioxide
SO_3	sulfur trioxide
STAR	Stability Array
TSP	total suspended particulates
TSS	total suspended solids
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WSA	wet-gas sulfuric acid
yr	year

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U.S. Department of Energy, 1988a. Program Opportunity Notice for Innovative Clean Cool Technology Program Demonstration Projects; Solicitation No. DE-PS01-88FE61530; Assistant Secretary, Management and Administration, Procurement Management, Office of Procurement Operations; Washington, DC; February 22, 1988.

U.S. Department of Energy, (DOE) 1988. Innovative Clean Coal Technology Programmatic Environmental Impact Analysis; Division of Fossil Energy; September 1988.

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APPENDIX A

ASSESSMENT OF FLOODPLAIN

AND

WETLANDS IMPACT

APPENDIX A

ASSESSMENT OF FLOODPLAIN AND WETLAND IMPACTS

A.1 PROJECT SUMMARY

The proposed project is a demonstration of a wet-gas sulfuric acid-sulfur dioxide and nitrogen oxide (WSA-SNOX) flue gas clean-up technology in an application involving the retrofit of an existing generating facility located near Niles, Ohio. The demonstration facilities will be constructed within and directly adjacent to Ohio Edison Niles Station, a coal-fired power plant operated by Ohio Edison Co. (Ohio Edison) on a 130-acre site along the southern bank of the Mahoning River, as indicated in Figure A-1. Ohio Edison also operates a nearby ash storage area that consists of three ash ponds. No project construction is expected within flood-prone or wetland areas.

A.2 ASSESSMENT OF POTENTIAL WETLAND IMPACTS

The U.S. Fish and Wildlife Service (USFWS) has inventoried and mapped wetlands for Ohio under the National Wetlands Inventory Program. Figure A-2 shows mapped wetlands in the vicinity of the Ohio Edison Niles power plant site and describes the wetland classification codes used on the wetlands map. No wetland areas are indicated on the Ohio Edison Niles power plant site. It should be noted that the USFWS maps specifically state that they are not intended to establish the geographical scope of governmental wetlands regulatory programs. Each regulatory agency defines and describes wetlands differently. The USFWS

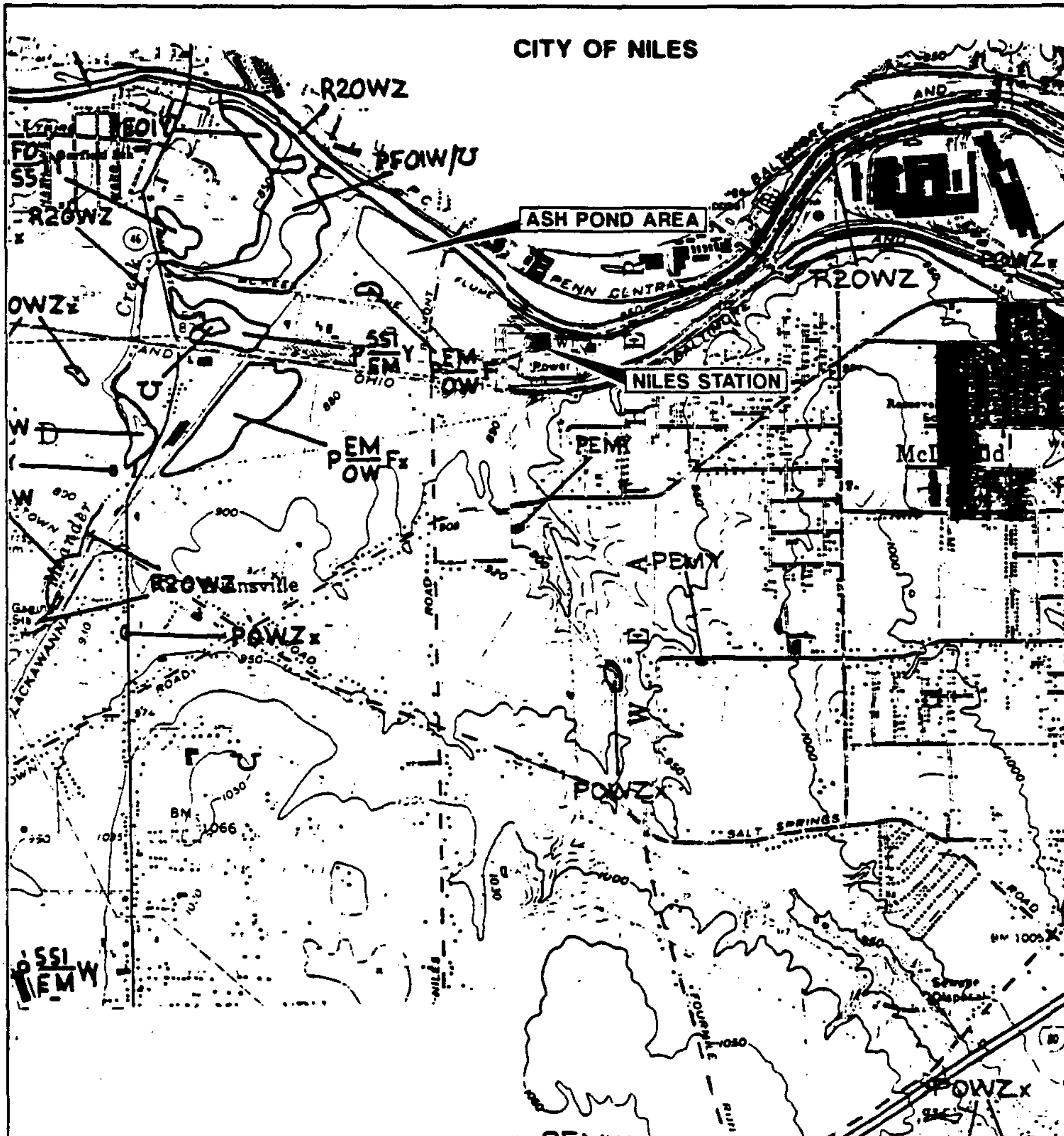
SOURCE: U.S.G.S. QUADRANGLES
GIRARD, OHIO 1962, PHOTOREVISED 1979
WARREN, OHIO 1959, PHOTOREVISED 1984
7.5 MINUTE SERIES

QUADRANGLE LOCATION

FIGURE A-1
SITE LOCATION MAP
WSA-SNOX DEMONSTRATION PROJECT
OHIO EDISON NILES STATION
NILES, OHIO

C-E Environmental, Inc.

5890-00



SOURCE: U.S. DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. APRIL 1977.
NATIONAL WETLANDS INVENTORY, GIRARD, OHIO.

SCALE

0 2000 4000 FEET

FIGURE A-2
WETLANDS IN VICINITY OF NILES STATION
WSA-SNOX DEMONSTRATION PROJECT
OHIO EDISON NILES STATION
NILES, OHIO

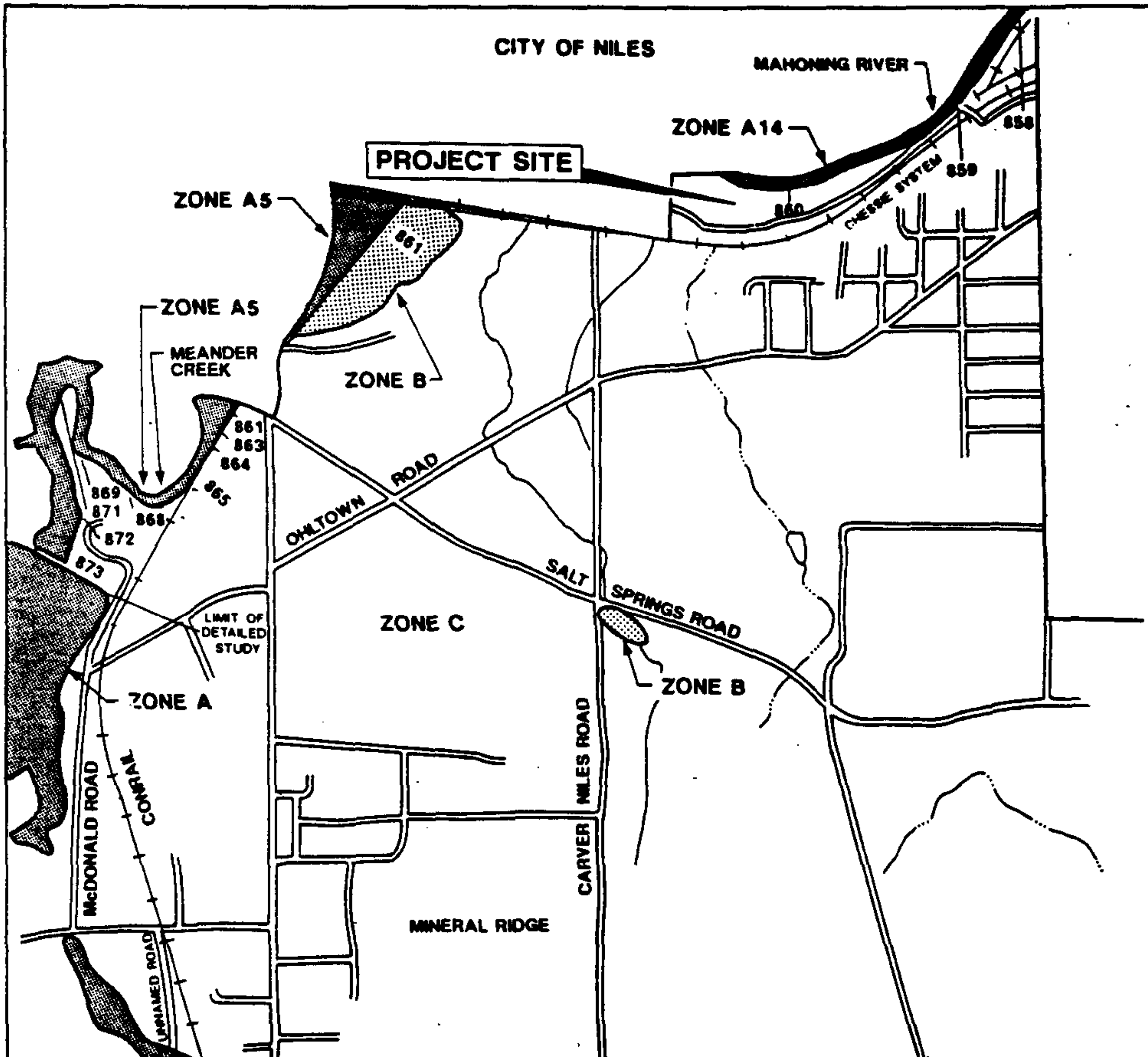
5890-00

C-E Environmental, Inc.

classifications make clear that the ash ponds are artificial diked impoundments or excavations. These areas may support flora and fauna adapted to wetland conditions; however the original purpose and continuing function of these areas is to serve the power plants as ash-settling facilities. These areas probably are not considered wetlands as defined by the U.S. Environmental Protection Agency (40 CFR 230.3[t]), the U.S. Army Corps of Engineers (33 CFR 328.3[b]), or Executive Order 11990 ("Protection of Wetlands"), because they either (1) are not "inundated by surface or groundwater with a frequency and duration sufficient to support a prevalence" or wetland vegetation or aquatic life, or (2) do not "under normal circumstances" support a prevalence of wetland vegetation or aquatic life. Neither WSA-SNOX project construction nor operation will encroach on any regulated wetland areas.

A.3 ASSESSMENT OF POTENTIAL FLOODPLAIN IMPACTS

Flood hazard areas do not encroach significantly on the power plant site. Figure A-3 shows the relevant portion of the Flood Insurance Rate Map published by the Federal Emergency Management Agency (FEMA) (Community Panel No. 3905350200B, September 29, 1978). Zone A14, the 100-year flood-prone area (flooding probability of 1 percent per year), is shown as extending onto the low-lying areas of the power plant site directly adjacent to the river shore. Portions of the site along the Mahoning River are located in floodplain areas; however, the main plant facility lies 15 feet above the calculated 100-year flood elevation of 860 feet above mean sea level. The existing ash ponds are



SOURCE FEDERAL EMERGENCY MANAGEMENT AGENCY, FLOOD INSURANCE RATE MAP, GIRARD, OHIO SEPTEMBER 29, 1978 PANEL No.3906350200 B

LEGEND

ZONE A ZONE B

ZONE DESIGNATIONS

ZONE A	AREAS OF 100-YEAR FLOOD; BASE FLOOD ELEVATIONS AND FLOOD HAZARD FACTORS NOT DETERMINED.
ZONE A1-A30	AREAS OF 100-YEAR FLOOD; BASE FLOOD ELEVATIONS AND FLOOD HAZARD FACTORS DETERMINED.
ZONE B	AREAS BETWEEN LIMITS OF THE 100-YEAR FLOOD AND 500-YEAR FLOOD; OR CERTAIN AREAS SUBJECT TO 100-YEAR FLOODING WITH AVERAGE DEPTHS LESS THAN ONE (1) FOOT OR WHERE THE CONTRIBUTING DRAINAGE AREA IS LESS THAN ONE SQUARE MILE; OR AREAS PROTECTED BY LEVEES FROM THE BASE FLOOD. (MEDIUM SHADING)
ZONE C	AREAS OF MINIMAL FLOODING. (NO SHADING)
860	MEAN ELEVATION ABOVE SEA LEVEL

APPROXIMATE SCALE

0 1000 2000 FEET

FIGURE A-3
FLOOD ZONES IN VICINITY OF NILES STATION
WSA-SNOX DEMONSTRATION PROJECT
OHIO EDISON NILES STATION
NILES, OHIO

C-E Environmental, Inc.

5890-00

LEGEND

SYSTEM — **P — PALUSTRINE**

CLASS	Subclass
RB — ROCK BOTTOM	1 Bedrock 2 Rubble
UB — UNCONSOLIDATED BOTTOM	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic
AB — AQUATIC BED	1 Algal 2 Aquatic Moss 3 Rooted Vascular 4 Floating Vascular 5 *Unknown Submergent* 6 *Unknown Surface*
US — UNCONSOLIDATED SHORE	1 Cobble-Gravel 2 Sand 3 Mud 4 Organic 5 Vegetated
ML — MOSS LICHEN	1 Moss 2 Lichen
EM — EMERGENT	1 Persistent 2 Nonpersistent
SS — SCRUB-SHRUB	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 *Deciduous* 7 *Evergreen*
FO — FORESTED	1 Broad-Leaved Deciduous 2 Needle-Leaved Deciduous 3 Broad-Leaved Evergreen 4 Needle-Leaved Evergreen 5 Dead 6 *Deciduous* 7 *Evergreen*
OW — *OPEN WATER/ Unknown Bottom*	

MODIFIERS

In order to more adequately describe wetland and deepwater habitats one or more of the water regime, water chemistry, soil, or special modifiers may be applied at the class or lower level in the hierarchy. The farmed modifier may also be applied to the ecological system.

WATER REGIME

Non-Tidal

- A Temporarily Flooded
- B *Saturated*
- C Seasonally Flooded
- D *Seasonally Flooded/ Well Drained*
- E *Seasonally Flooded/ Saturated*
- F Semipermanently Flooded
- G Intermittently Exposed
- H Permanently Flooded
- J Intermittently Flooded
- K Artificially Flooded
- W Intermittently Flooded/Temporary
- Y Saturated/Semipermanent/ Seasonal
- Z Intermittently Exposed/Permanent
- U *Unknown*

Tidal

- K *Artificially Flooded*
- L Subtidal
- M Irregularly Exposed
- N Regularly Flooded
- P Irregularly Flooded
- *S Temporary-Tidal
- *R Seasonal Tidal
- *T Semipermanent Tidal
- *V Permanent Tidal
- U *Unknown*

*These water regimes are only used in tidally influenced freshwater systems

WATER CHEMISTRY

Coastal Halinity

- 1 Hyperhaline
- 2 Euhaline
- 3 Mixohaline (*Brackish*)
- 4 Polyhaline
- 5 Mesohaline
- 6 Oligohaline
- 0 Fresh

Inland Salinity

- 7 Hypersaline
- 8 Eusaline
- 9 Mixosaline
- 0 Fresh

pH Modifiers for all Fresh Water

- *a Acid*
- t Circumneutral
- i Alkaline

SOIL

- g Organic
- n Mineral

SPECIAL MODIFIERS

- b *Beaver*
- d *Partially Drained/Ditched*
- f *Farmed*
- h *Diked/Impounded*
- r Artificial Substrate
- s *Spoil*
- x Excavated

SOURCE: U.S. DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE 1988. NATIONAL WETLANDS INVENTORY, GIRARD, OHIO.

FIGURE A-3 (CONTINUED)
WETLANDS IN VICINITY OF NILES STATION
WSA-SNOX DEMONSTRATION PROJECT
OHIO EDISON NILES STATION
NILES, OHIO

C-E Environmental, Inc.

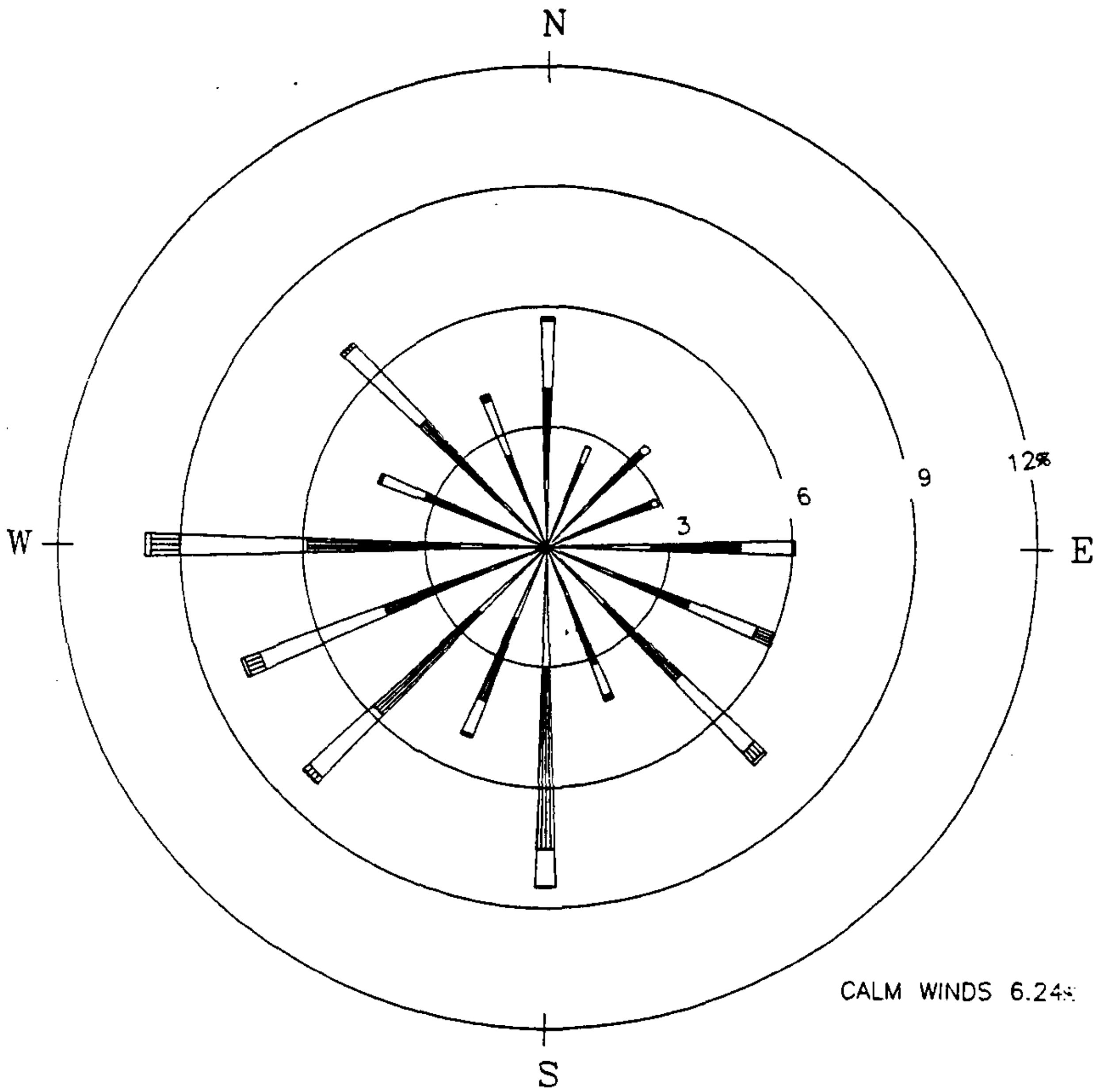
5890-90

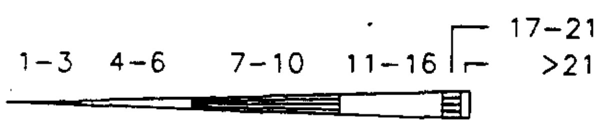
also bermed approximately 18 feet above the calculated 100-year flood elevation. The berms surrounding the ash pond area are constructed of native low-permeability soils and compacted to prevent rupture during periods of high water. The project area will be situated above the 100-year flood elevation; therefore, flood-prone areas on the Ohio Edison Niles site along the shore of the Mahoning River will not be encroached upon by the new facilities.

APPENDIX B

YOUNGSTOWN, OHIO

WINDROSES





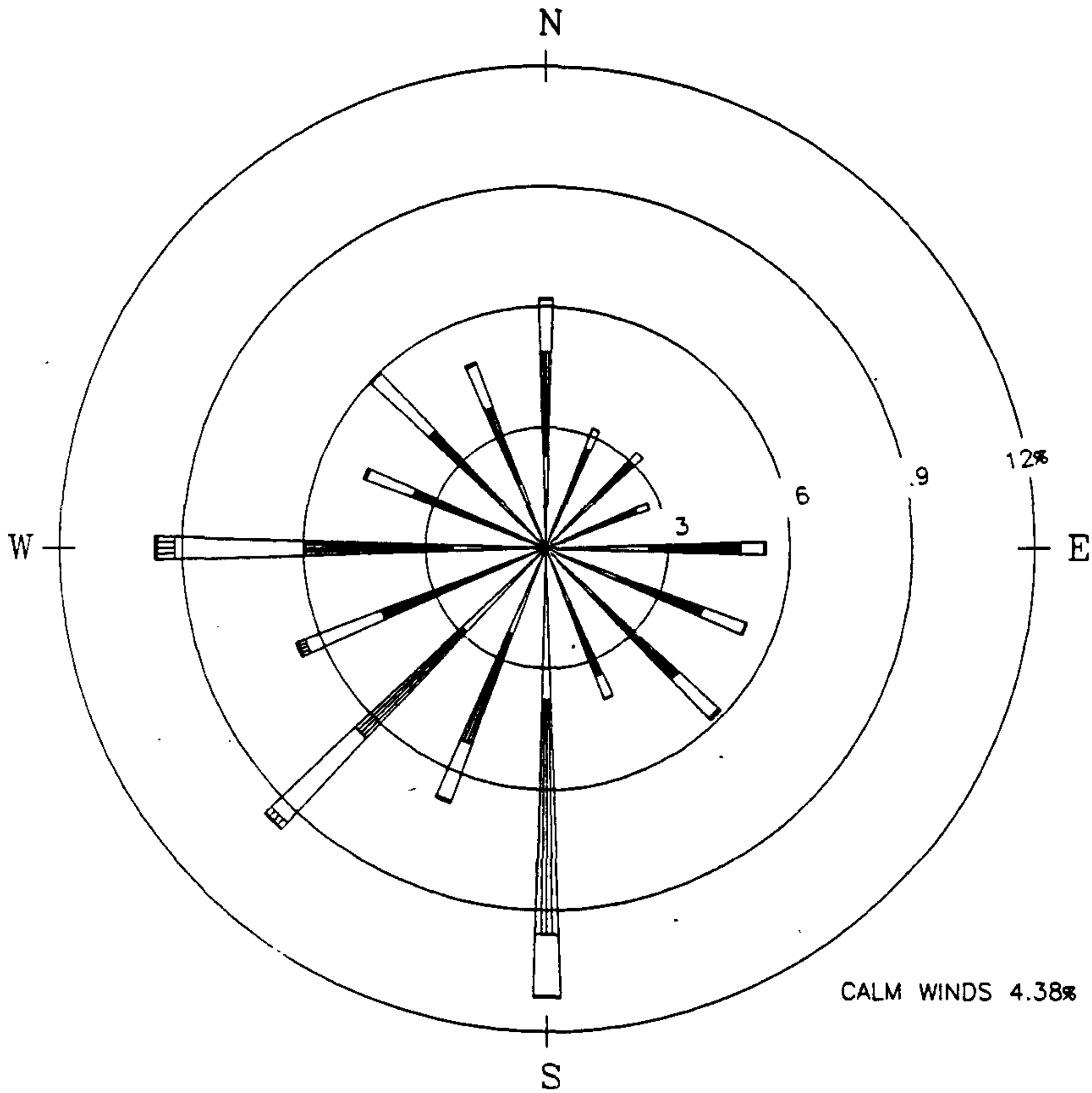
WIND SPEED CLASSES
(KNOTS)

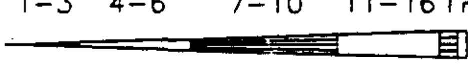
NOTES:
DIAGRAM OF THE FREQUENCY OF OCCURRENCE FOR EACH WIND DIRECTION. WIND DIRECTION IS THE DIRECTION FROM WHICH THE WIND IS BLOWING. EXAMPLE – WIND IS BLOWING FROM THE NORTH 5.8 PERCENT OF THE TIME.

WINDROSE

STATION NO. 14852
YOUNGSTOWN, OH
PERIOD: 1983

FIGURE B-1





WIND SPEED CLASSES
(KNOTS)

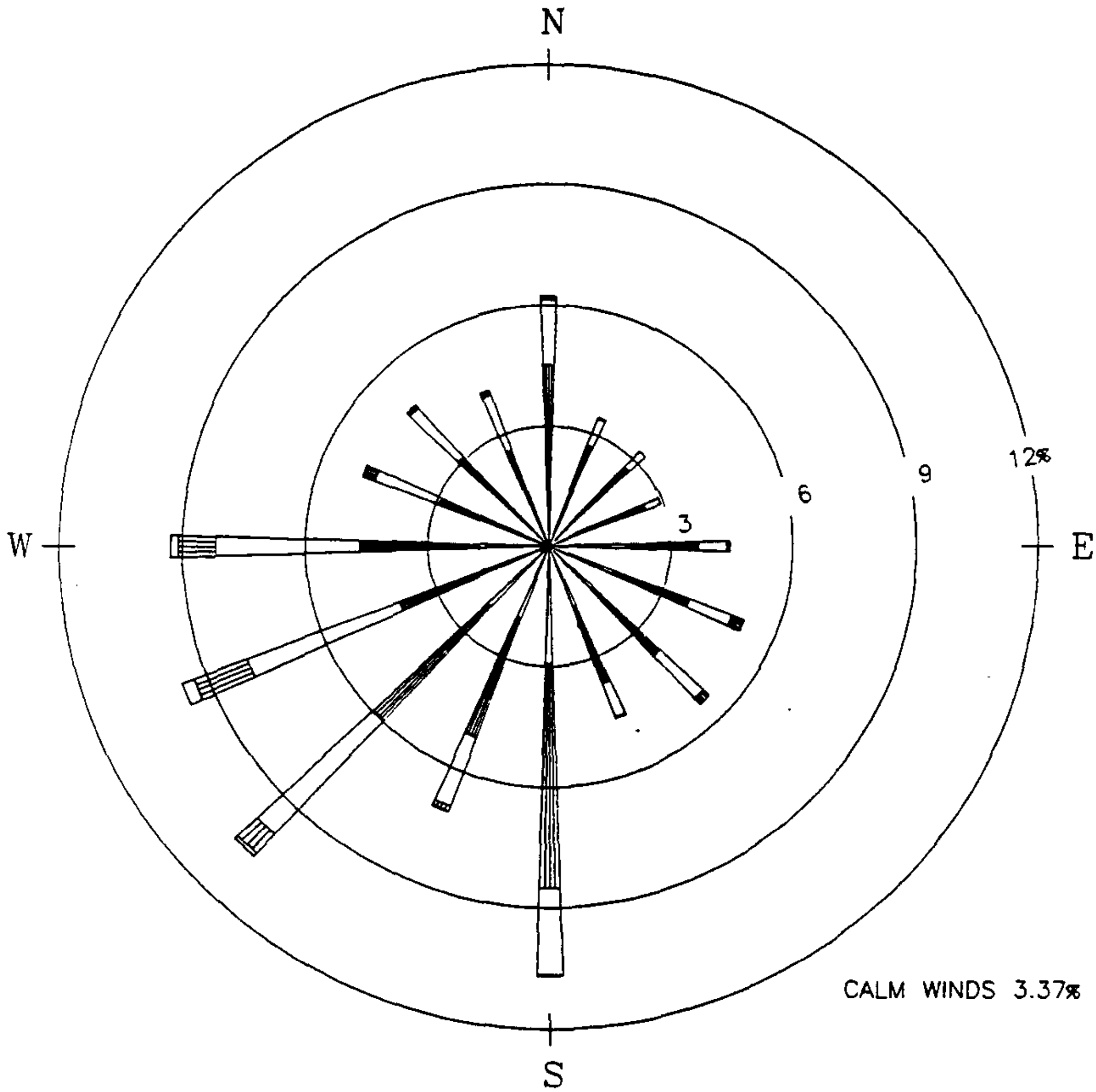
NOTES:
DIAGRAM OF THE FREQUENCY OF OCCURRENCE FOR EACH WIND DIRECTION. WIND DIRECTION IS THE DIRECTION FROM WHICH THE WIND IS BLOWING. EXAMPLE - WIND IS BLOWING FROM THE NORTH 6.2 PERCENT OF THE TIME.

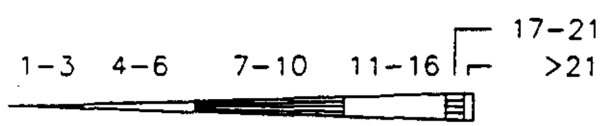
WINDROSE

STATION NO. 14852
YOUNGSTOWN, OH
PERIOD: 1984

FIGURE B-2

C-E Environmental, Inc.





WIND SPEED CLASSES
(KNOTS)

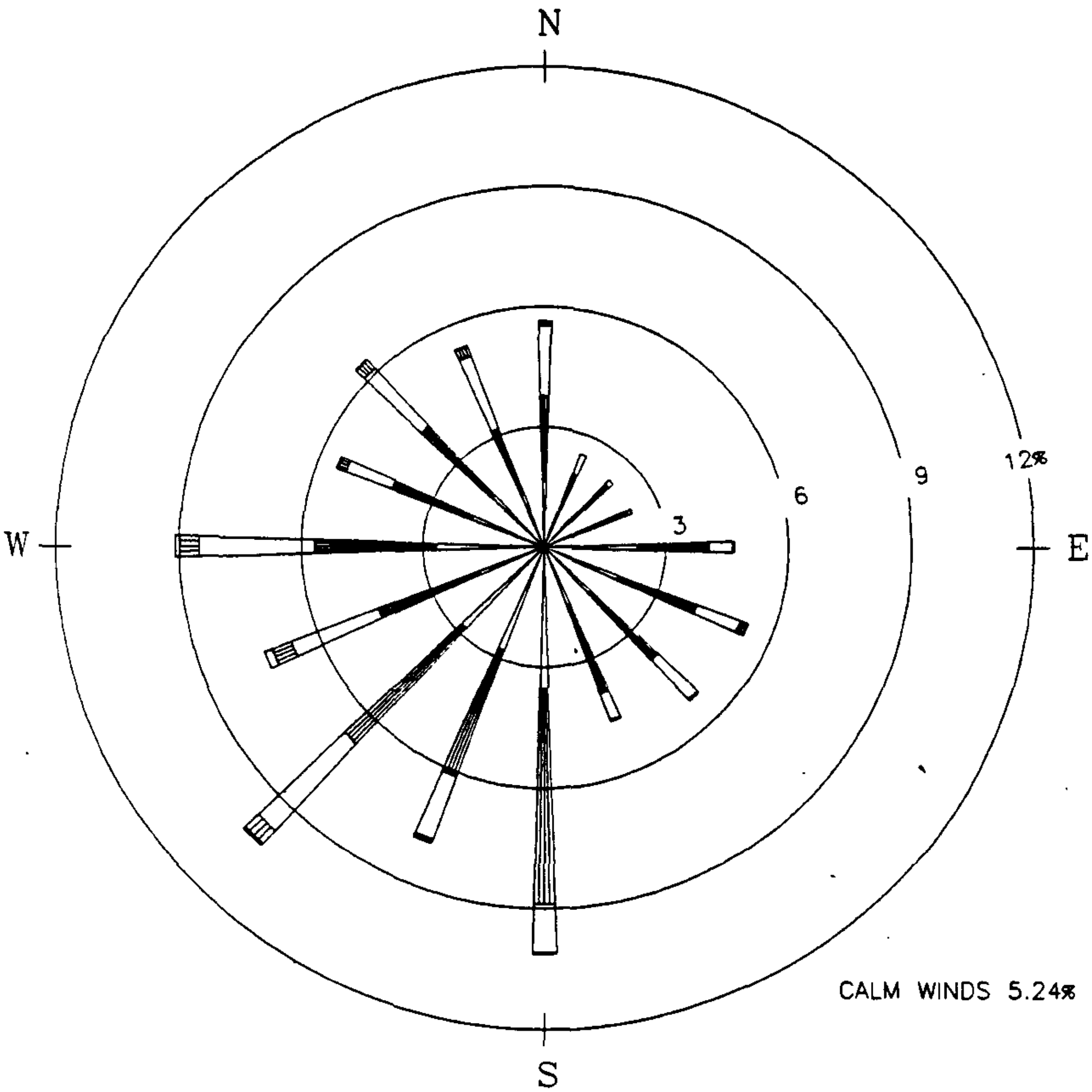
NOTES:
DIAGRAM OF THE FREQUENCY OF OCCURRENCE FOR EACH WIND DIRECTION. WIND DIRECTION IS THE DIRECTION FROM WHICH THE WIND IS BLOWING. EXAMPLE - WIND IS BLOWING FROM THE NORTH 6.2 PERCENT OF THE TIME.

WINDROSE

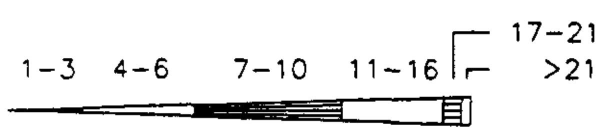
STATION NO. 14852
YOUNGSTOWN, OH
PERIOD: 1985

FIGURE B-3

C-E Environmental, Inc.



CALM WINDS 5.24%



WIND SPEED CLASSES
(KNOTS)

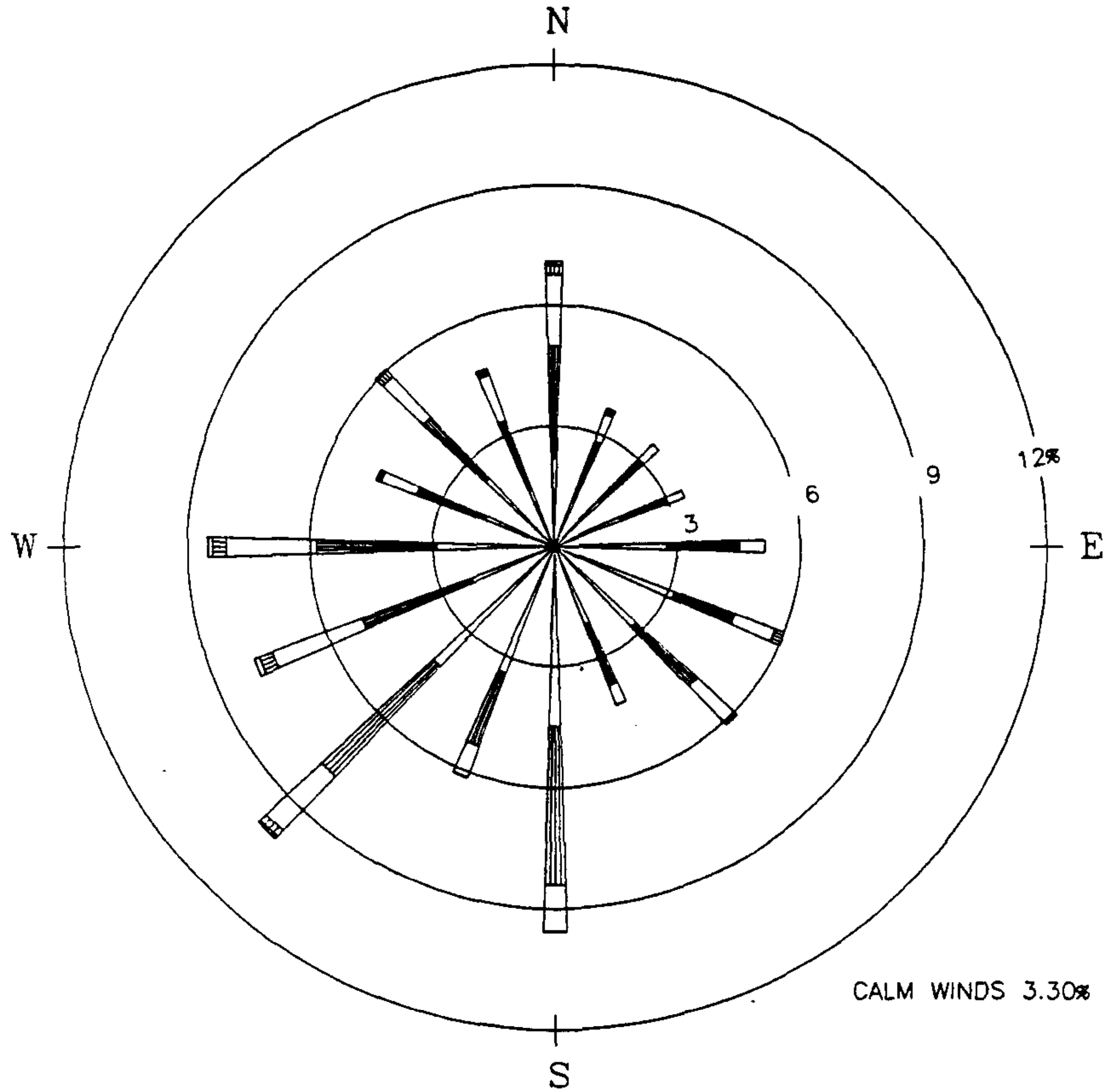
NOTES:
DIAGRAM OF THE FREQUENCY OF OCCURRENCE FOR EACH WIND DIRECTION. WIND DIRECTION IS THE DIRECTION FROM WHICH THE WIND IS BLOWING. EXAMPLE - WIND IS BLOWING FROM THE NORTH 5.6 PERCENT OF THE TIME.

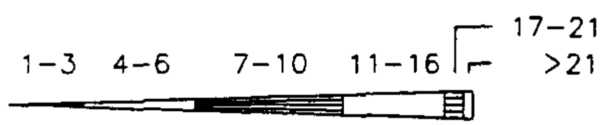
WINDROSE

STATION NO. 14852
YOUNGSTOWN, OH
PERIOD: 1986

FIGURE B-4

C-E Environmental, Inc.





WIND SPEED CLASSES
(KNOTS)

NOTES:
DIAGRAM OF THE FREQUENCY OF OCCURRENCE FOR EACH WIND DIRECTION. WIND DIRECTION IS THE DIRECTION FROM WHICH THE WIND IS BLOWING. EXAMPLE – WIND IS BLOWING FROM THE NORTH 7.1 PERCENT OF THE TIME.

WINDROSE

STATION NO. 14852
YOUNGSTOWN, OH
PERIOD: 1987

FIGURE B-5

APPENDIX C

CULTURAL RESOURCES LITERATURE REVIEW

DATE: November 16, 1989

TO: Jacqueline Dingfelder, Planner
C-E Environmental, Inc.
261 Commercial Street
P.O. Box 7050
Portland, Maine 04112

FROM: Bruce W. Aument, Principal Investigator
Archaeological Services Consultants, Inc.
3037 Indianola Avenue
P.O. Box 02095
Columbus, Ohio 43202

RE: **Cultural Resources Literature Review For The WSA-SNOX Project, Ohio Edison Niles Station, Niles, Ohio**

The area for the proposed WSA-SNOX Demonstration Project lies within the 130 acre tract on which the Ohio Edison Niles Station, Power Generating Plant Facility is situated. The power plant is located on the Mahoning River floodplain along the southeastern boundary of the City of Niles, Trumbull County, in northeastern Ohio (Map 1). The literature review indicated the project area has not been subjected to any documented professional or amateur field surveys concerning prehistoric, historic and architectural cultural resources. Consequently, no prehistoric and historic archaeological sites nor structures have been reported to occur within the project area.

Methodology Of The Literature Review

The primary objectives of the literature review are to determine if any cultural resource surveys have been conducted and if so, whether any cultural resources, in the form of archaeological sites and/or standing historic structures have been reported within the proposed project area. The Ohio Historical Society in Columbus, Ohio serves as the state repository for such information and the following archival resources were examined:

1. Ohio Archaeological Inventory, Trumbull County File;
2. Ohio Historic Inventory, Trumbull County File;
3. Department of Archaeology U.S.G.S. 7.5' and 15' Topographic maps;
4. Trumbull County Archaeology File;
5. National Register of Historic Places;
6. Ohio Archaeological Council Report File; and
7. Trumbull County Histories and Atlases.

All inventoried archaeological site and historic structure locations within the proposed project area and the immediately surrounding tracts were transposed to U.S.G.S. 7.5' topographic quadrangles, which served as base maps, and pertinent site information was transcribed. Stated methodologies of the surveys conducted within and adjacent to the proposed project area were reviewed to determine the quality and reliability of the reported site information.

Results Of The Literature Review

The literature review indicated no reported professional nor amateur fieldwork had been conducted within the proposed project area and consequently no sites and structures have been inventoried. However, the proposed project area lies within a development planning area outlined by the Trumbull County Planning Commission, including the Mahoning River valley and its tributaries from the City of Warren to the southern county border. The floodplains and terraces of these watercourses were labeled as archaeologically sensitive (White 1977 and Lee 1982). Since the term is not defined, its applicability to the proposed project area is questionable. Apparently, this finding is based on the results of numerous small scale archaeological and architectural field surveys and archival reviews within portions of the planning area. However, none of this work included the proposed project area. Reports for several contract cultural resource surveys conducted in and around the cities of Warren and Niles, and the towns of McDonald and Girard were consulted to determine the meaning of the term archaeologically sensitive and its applicability to the project area.

At least fourteen contract surveys were conducted within the development planning area, only one of which involved a tract of land immediately adjacent to the proposed project area (White 1978). The surveyed tract lies west of the Ash Pond between the railroad tracks and South Main Street. During the survey two buried prehistoric sites were encountered by subsurface test unit excavations and a historic residential complex was inventoried (Map 1). The historic residence was eventually listed on the National Register of Historic Places as the Ward-Thomas House. The two buried prehistoric sites consist of small, low density lithic concentrations occurring at a level between 20 and 30 inches below the present surface. Both sites are situated along Meander Creek near its confluence with the Mahoning River. The reported results of the testing do not clearly indicate if these artifacts represent an intact buried cultural horizon or a buried plowzone. The items were apparently recovered through backdirt screening and no cultural features were encountered.

The potential for buried prehistoric sites occurring along the Mahoning River valley has been minimally documented. No deep testing of the floodplain has been conducted by any of the surveys, including the one in which sites, 33 Tr 38 and 39 were encountered. Contradictory results are reported for the potential of locating prehistoric sites within areas of historic disturbance along the floodplain, which indicates the nature of the particular historic disturbance processes of a particular area is an important determining factor. Prehistoric sites represented by surface lithic scatters occur more frequently on terraces and rises at elevations between 30 and 60 feet above the floodplain. They tend also to cluster at the confluences of the Mahoning River and its tributaries.

Of the remaining thirteen surveys, three address the issue of prehistoric land use patterns (Shane 1975; DeSanti 1977; and Brown 1981). However, all three surveys were along tributaries rather than the Mahoning River floodplain. The findings indicate long term, periodic, prehistoric occupation of well drained terraces and floodplain rises with ease of access to a diversity of microenvironmental niches being a primary locational determinate. Whether or not this land use pattern is applicable to segments of the main river valley between the confluences has yet to be demonstrated. Thus, the potential existence of an unreported prehistoric site within the proposed project area is indicated, however, the nature and extent of such a cultural resource cannot be accurately postulated on present evidence.

The county histories indicate initial Euro-American settlement of the region occurred between 1797 and 1801 in an area approximately one mile west of Niles, known as the Salt Springs tract (Williams 1882:222). Salt manufacturing and farming were the primary pursuits of the pioneer settlers. Discovery of iron ore deposits around 1817 lead to the establishment of a small furnace at the confluence of Mosquito Creek and the Mahoning River (Upton 1909:603). Grist and saw mills were also established in the same area. From this focal point, the City of Niles was platted in 1834 with residential and commercial development occurring almost exclusively on the north side of the Mahoning River. The early county atlases indicated the proposed project area was situated within a large tract which maintained its shape throughout a 25 year period and subsequent ownership (Everts 1874:31;

and American Atlas Co. 1899:29). The location of the residence and an orchard on the high ground at the southern end of the tract suggests the majority of the land was used for agriculture. The U.S.G.S. 15' topographic maps (Warren 1908 and Youngstown 1908) indicate no change in the tract. Thus it would appear no historic structures existed in the proposed project area until the construction of the power generating plant in the mid 1950s.

Based on the results of the literature review and the nature of the proposed WSA-SNOX demonstration project within an historically disturbed area, the potential of encountering an undisturbed prehistoric and/or historic archaeological sites or structures appears low. The proposed project area is situated in a tract for which the primary historic land use practice appears to have been agricultural until the construction of the power generating plant. Although the floodplain landform on which the proposed project area is situated is of similar elevation to others which contain prehistoric sites; it is not in close proximity to a tributary drainage confluence of the Mahoning River, the second conditional factor in prehistoric site locations of the region. The construction of the power generating plant and Ash Pond has altered substantially this landform. The proposed project utilizes existing facilities with minimal ground disturbance. Therefore, even though a possibility for an archaeological site within the proposed project area exists; the potential for recovery of significant cultural information is low.

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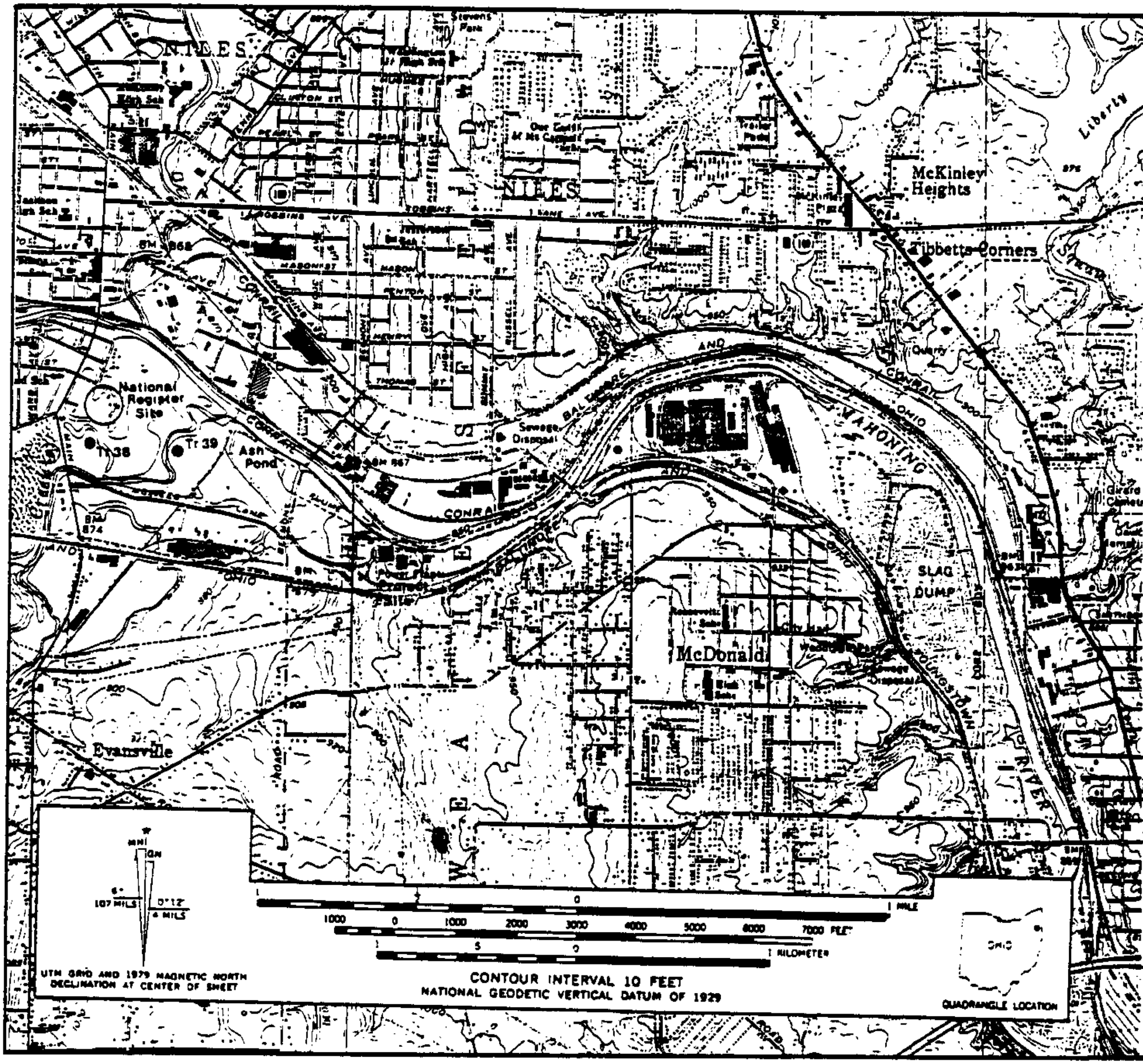

Map 1. Known sites in the vicinity of the project area.